The Relationship between Changes in Cash Dividends and Volatility of Stock Returns

- A Study of the Swedish Stock Market

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Sincerely,
Cecilia Nylander and Sandra Renberg

Abstract

The dividend policy and the distribution of cash dividend can be of interest to the investors from many angles. Consequently, many theories have been built on the relevance of dividend policy and there are several theories proposing that dividends increase shareholder value. However, the most famous theory on dividend policy might be Miller and Modigliani's dividend irrelevance theory which implies that the dividend policy does not affect shareholder value.

Although investors are concerned with shareholder value they are also concerned with achieving the highest possible return with the lowest volatility (risk). As many studies have focused on the dividend policy, especially dividend yield or the dividend payout ratio, and its relation with stock price movement we felt that there was a lack of information regarding the relation between return volatility and cash dividends. This resulted in the following research question:

Does a change in cash dividend affect stock return volatility on NASDAQ OMX Stockholm?

Answering this research question is the main purpose of the research. Additionally, the relationship between changes in cash dividend and return volatility will be compared in the different size segments that are to be found on NASDAQ OMX Stockholm.

The study is quantitative with a deductive approach where historical data ranging from 2006-2012 has been gathered. Two measures of return volatility has been used, beta and standard deviation of return. Statistical tests have been conducted in an approach to answer the research question, mainly correlation tests and logistic regression analysis.

No correlation between changes in cash dividend and changes in beta, nor changes in standard deviation were found. The same results were found when examining small, mid and large cap individually. In the logistic regression analysis no evidence was found that changes in dividend could explain changes in return volatility. Contrary to changes in dividend, the results indicate that the size of the company can explain changes in return volatility. Specifically, large cap companies explain increases in return volatility better than companies in the small cap segment. Therefore, the research question is concluded with no, a change in cash dividend does not affect stock return volatility. The findings could also be argued to be in support of the dividend irrelevance theory. Furthermore, the conclusion implies that investors need not regard the dividend policy when diversifying their portfolios. Additionally, managers need not be worried that a change in dividend policy should affect return volatility.

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Glossary

Beta (β) – measures the volatility of an asset in relation to the overall financial market. It is usually represented by a benchmark index, in Sweden for example the OMX Stockholm Benchmark Index. Beta illuminates the statistical variance that cannot be diversified away because of the correlation of the asset's returns with the market return. A beta of 1 perfectly moves with the market. An asset with a beta higher than 1 is more volatile to market factors and will move more than the index. An asset with a beta below 0 generally moves in the opposite direction of the market.

Capital Gain – when an asset's value has increased and is higher than the purchase price. For example, if you invest 80 SEK at time X and can sell the stock for 100 SEK at time Y, a capital gain of 20 SEK would be realized.

Cash Dividends – dividend distributed in the form of currency, via electronic transfer. This is the most common form of distributing earnings to shareholders.

Dividends – the payment of a portion of the firm's earnings, with the purpose of returning wealth, to its shareholders. Dividends generally come in the form of cash or stock. Dividends are usually distributed annually in Sweden.

Historical Volatility - the volatility that was realized during a particular time in the past. It is calculated using time series of past market prices. This is a very commonly used measure for risk managers.

Risk-Return Tradeoff – refers to the fact that investors are usually risk averse and therefore, an asset with a higher risk requires a higher potential return. For example, a bond generally has low risk and provides relatively low returns whereas investing in a stock imply taking on a higher risk for the possibility of receiving higher returns.

Standard Deviation - a measure of how risky an investment is and is the most common measure for volatility. It can be referred to as how much the spread deviates from the mean. The larger the spread is from the mean, the higher the standard deviation.

Stock Return – the percentage gain or loss of an asset's value over a particular period of time. To calculate the stock return the net gain or loss is divided by the total value of the stock at the beginning of the period, and multiply by 100 to express the stock return in percentage.

Volatility - can be defined as "*a measure of uncertainty of the return realized on an asset"* (Hull, 2012b, p.612). This is often referred to as the level of risk that a security has. The more volatile an asset is, the riskier it is to invest in the security. The more a stock's price fluctuates around the mean stock price, the more volatile the stock is.

Chapter 1 – Introduction

In this chapter we will introduce the reader to the research topic. First, the problem background will be discussed followed by the research question and research purpose. In the second half of the chapter, research gap, research contribution and delimitations will be presented.

1.1 - Problem Background

Volatility and dividend policy are two highly researched concepts within modern finance. However, there seems to be no consensus among researchers on the subject of dividend policies. Moreover, the relationship between dividend policy and stock return volatility is rather unexplored although it could be of great interest for investors' decision making.

The dividend policy is the decision of what proportion of earnings that should be distributed to the company's shareholders (Arnold, 2008, p.840). It includes the flow and fluctuations of dividends from year to year (Arnold, 2008, p. 856). After paying interest and taxes, management can decide to either distribute a part of the residual of the operating income as cash dividends to the firm's shareholders or reinvest it in the firm which increases share value (Bodie et al., 2009, p.36). Cash dividends are distributed to shareholders in currency and are taxable for the recipient, this is the most common type of dividend. Another form of dividend is scrip dividends. Shareholders then receive additional shares rather than receiving cash dividends. (Arnold, 2008, p.850)

There is no straightforward answer to what policy on dividends should be taken. Basically there are two extreme positions, ranging from the relevance of dividends to the irrelevance of dividend policy on share value. In 1956 the dividend discount model was introduced by Myron J. Gordon and Eli Shapiro. The model values shares based on the net present value of future dividends, market value of the shares thus depends on dividends (Gordon and Shapiro, 1956, p.105). On the other hand, the Miller-Modigliani theorem, also known as the dividend irrelevance theory, states that in a perfect market the dividend policy is irrelevant to firm value (Miller and Modigliani, 1961, p.414). This theory of dividend irrelevance can be questioned as it is based on several assumptions that are probably not applicable in the real world. Furthermore, since these ideas were first introduced much research has been done on the topic and is one of the most researched areas in modern finance. It has been found that, empirically, there is some interdependence between dividend yield and share prices (Kinkki, 2001 p.59).

Many studies try to document the relationship between dividend payments and the stock return effect. Most research proves the existence of a statistically significant relationship between the dividend yield and the stock return (Kinkki, 2001 p.59). When a firm announces its dividend distribution it can send a signal. It can convey information regarding the prospect for future earnings. An announcement of an increase of dividend would convey that the prospects for future earnings are optimistic and a decrease sends the signal that the prospects for future earnings are pessimistic. The signal effect of dividend occurs because of information asymmetry. As

management has substantially more information regarding the prospects of future earnings than investors do. The direction of the share price change can then depend on if the announcement of increase or decrease of dividends is above respectively below the expected level of dividends. (Arnold, 2008, p.847).

What has been a less researched topic within this area is the relationship between dividends and the volatility of stock performance. Volatility can be defined as *"a measure of our uncertainty about the returns provided by the stock"* (Hull, 2012a, p.303) *or "the standard deviation of the return provided by the variable per unit of time when the return is expressed using continous compounding"* (Hull, 2012b, p.205). Usually volatility of stocks is around 15% and 60% in terms of standard deviation (Hull, 2012a, p.303).

It is interesting to know why volatility changes over time. The common view as to why volatility change is because new information enters the market. People then revalue their investments, which causes the stock price to change and thereby also the volatility. This view is although not backed up by research. Hull is instead arguing that volatility is, for most part, caused by trading itself. (Hull, 2012a, p.307). Robert A Olsen (1998, p.17) argued that decisions that are highly reversible, emotional and exposed to time stress, are those that are more experimental. The stocks that are subject to this kind of experimental trading can be expected to have high stock price volatility. Miller (1977, cited in Olsen, 1998, p.17) also said that the more the opinion of traders diverge, the greater the price volatility, unless there are complete arbitrage opportunities.

The risk-return is a commonly used concept among financial economists. This concept is also closely connected to the concept of volatility. By risk-return it is meant that a riskier investment should be compensated for by a higher possible return, while a less risky investment generates a smaller possible return on average (Ludvigson and Ng, 2007, p.172). This means that the higher the volatility, the higher the expected return and vice versa.

It is crucial for investors to keep track of the volatility of the securities they keep in their portfolio. That is because the value of their portfolio is depending on it. Standard deviation of the proportional change in a stock during a day is an alternative measure to the daily volatility of a security (Hull, 2012b, p.205-206). By standard deviation, it is meant how much the proportional change in a stock during a day deviates from the mean on average. There are however more than one way to measure volatility, besides standard deviation beta is also commonly used. Beta can be defined as *"a measure of the systematic risk of an asset"* (Hull, 2012a, p.798). A portfolio with a beta of 1 will generate exactly the same return as the index. A portfolio with a beta of 2 will however generate twice the return of the index and a portfolio with a beta of 0.5 will generate half as much as the index and so on (Hull, 2012a, p.62).

When it comes to stock return volatility we are referring to how sensitive the stock's return is on the market. The stock is performing well as the stock price rises, which results in greater stock returns and poorly as the stock price decreases which results in lower stock returns. Large fluctuations indicate that the stock return is volatile. Evidence shows that announcements concerning regulatory policy, corporate control and macroeconomic conditions have an influence on the stock price (Cutler et al., 1998, p.56) and thus return volatility. It seems to become increasingly common for firms to pay dividends and to do so on a regular basis. As the ongoing debate of

dividend policy concerns the relationship between dividends and stock price movements, it could be of interest to look at the relationship between return volatility and dividends. A study done on the UK market in 2011 on dividend policy and share price volatility found that there was a positive relationship between dividend yield and stock price changes, whereas there was a negative relationship between the volatility of stock price and dividend payout ratio. A higher dividend payout ratio made stock price less volatile. (Hussainey et al., 2011 p.57). As far as our knowledge goes, no similar studies with a focus on return volatility rather than stock price volatility have been done on the Swedish market.

1.2 - Research Question

Building on the problem background we find that there is much research on stock price and dividend policy, and that there is a debate on the underlying factors for the relationship of these variables. A less researched subject in the same field is how dividend payments affect the volatility of a stock's return on the market. We are interested in exploring if there is a relationship between a firm's decision to distributing cash dividends and/or reinvesting the earnings into the firm and its stock's return volatility. On these grounds the following research question has been developed:

- *Does a change in cash dividend affect stock return volatility on NASDAQ OMX Stockholm?*

1.3 - Research Purpose

If a change in cash dividends have a relationship with changes in stock return volatility it should imply that it is best to keep stable, regular dividends, both from investors' and managements' viewpoint.

The purpose of this study is to see if a change in cash dividend affects changes in stock return volatility. We will investigate firms listed on the Stockholm Stock Exchange (NASDAQ OMX Stockholm) over the period of 2007-2012. The purpose is to see if more stable dividends, with no significant change, actually imply more regular returns and therefore less volatility. Specifically, we are interested in finding whether the mere existence of a change in dividends is related to changes in return volatility. As there is a lack of research in this specific area the purpose of this study is furthermore to bring some new information to the field.

Moreover, the purpose of this research is also to look at differences between small, medium and large cap firms and taking the firms' sizes into account when examining the relationship of changes in cash dividend and changes stock return volatility. Firms' market capitalization could be a factor for differences in dividend payments but also for differences in volatility. Accordingly it will be interesting to investigate whether changes in dividend payments made by a large firm have a different effect on stock return volatility than changes by smaller firms. Therefore, we will divide the sample into sub-samples of small, medium and large caps as listed on NASDAQ OMX Stockholm. This allows us to compare results between different capitalization sizes.

1.4 - Research Gap

Dividend policy concerns all listed firms on the stock exchange. It also concerns the shareholders who can benefit from it depending on their preference for dividends or capital gains in later stages. This has been widely studied, if dividends can affect the firm value and following what the best dividend policy is in such a case. The dividend irrelevance theory is becoming more and more questioned. Studies seem to point to a relationship between dividend and stock return. As mentioned previously there are not many studies that are studying how changes in dividends affect the volatility of stock returns. Rather the debate has focused on the relationship between dividend policy and stock price movement.

More similar to our research, Baskin (1989) did a study on US-firms, Allen and Rachim (1996) on Australian firms and Hussainey et al. (2011) did a study on UK firms. However, the results of these studies are not conclusive as the results were different in different countries. This could indicate that there are differences in markets. Moreover, these studies looked at stock price volatility and its relation to dividend payout ratio and dividend yield, the two most common measures for dividend policy. What differentiates our study is that we will look at the *change in cash dividends* rather than the dividend payout ratio or dividend yield. Furthermore, the mentioned studies concerned stock price volatility, whereas this study will look at stock return volatility. The use of these variables will bring a new perspective to research of the relationship between dividends and stock performance and as such, more advanced knowledge. Moreover, this study will be conducted on firms listed on the Swedish market and will include more recent data and as such recognizes that there has been a development in the economy during the years. In this way we aim to contribute to this field of finance and the gap within this field of research.

1.5 - Research Contribution

The aim of this research is to contribute both in a theoretical and practical manner. As this research question concerns an area that is not much explored in academic studies our aim with this research is for it to work as a scientific contribution for further research. If changes in dividends have a relationship with changes in return volatility this is something that can and should be explored further. Moreover, our findings can be of practical importance, specifically for investors but also for management. If dividends have an impact on the volatility of a stock's performance this is of interest for investors as they are concerned with volatility. From a firm's perspective our findings can contribute as a tool for setting the dividend policy. This will be of importance even if no relationship is found, since investors as well as management do not have to take the dividend effect in to account when diversifying their portfolio, respectively when setting the dividend policy.

Looking specifically at the Swedish market, we are not aiming for a universal contribution applicable on the world market, but rather only as an overview of the Swedish market. Furthermore, since similar research questions are not much explored in previous research, and especially not in the Swedish market, this paper will work as a base for further research.

If we find that there is a relationship between changes in dividends and changes in volatility of stock return on the NASDAQ OMX Stockholm, this will be of great

benefit for investors. That is because it gives them the possibility to revalue their investment choices, having more facts at hand, and accordingly review the diversification of their portfolios. Furthermore, if we find that stock return volatility increases because of higher dividends, investors may put aside their preference for dividends in return for a safer investment or vice versa.

As for management, this study will make them aware of what outcome their choice of dividend policy will have. If we find that dividend influences stock return volatility, then management can affect how volatile they wish for their stocks to be.

1.6 - Delimitations

We will limit our study to companies listed on NASDAQ OMX Stockholm. Furthermore, we will limit our sample to companies that have been present on the Stockholm Stock Exchange since 2006. We will study the years 2007-2012. The data from these five years will provide us with a large enough sample to get a trustworthy result. Companies listed that have not distributed any cash dividends during this time period will be excluded from the sample.

Furthermore, we will be concentrating on the annual cash dividends as this is the primary form of distributing dividends in Sweden. Other forms of dividends will be excluded. In addition, the effect of taxes and fees will also be excluded from our study. That is because taking taxes and fees in to account would be a tedious task as the firms are listed in different tax brackets.

1.7 - Disposition

Chapter 1: Introduction
In this chapter we will introduce the reader to the research topic. First, the problem background will be discussed followed by the research question and research purpose. In the second half of the chapter, research gap, research contribution and delimitations will be presented.

Chapter 2: Theoretical Methodology
In this chapter, we will introduce the theoretical methodology for the research. It starts off with an introduction of the choice of subject and our preconceptions, thereafter we highlight the research philosophical assumptions followed by a description of the research approach, research method and research design. In the end of the chapter, we will introduce the sources of literature and data and discuss the reliability and validity of the study. Finally, the chapter will end with a brief summary of the theoretical methodology.

Chapter 3: Literature Review
This chapter will cover theories and the result of previous similar studies that are relevant for our research. The chapter starts with an introduction of the NASDAQ OMX Stockholm, followed by an overview of the dividend irrelevance theory. Thereafter, we will introduce several dividend relevance theories including Signaling Theory, Agency Cost Theory, Bird-in-the-Hand Hypothesis as well as the Clientele Effect. We will continue the chapter by introducing important concepts for our research such as risk-return, volatility, beta and standard deviation. Finally, we will

end the chapter with an overview of previous similar studies that are of relevance for our research.

Chapter 4: Practical Methodology
This chapter aims to make the reader familiar with the practical methodology of the research. Firstly, the sample data and time horizon will be presented, followed by a description of the data collection and data frequency. Thereafter, the estimation of variables will be explained as well as the statistical analysis that will be utilized. The chapter ends with a presentation of the hypotheses for the statistical tests.

Chapter 5: Empirical Findings
This chapter presents the reader with the empirical findings of the research. First, we present the descriptive statistics for the coded variables that will be used in the logistic regression analysis, then the results from the normality tests. This will be followed by the results from the correlation testing between our variables. The findings from the logistic regression analysis will be presented at the end of the chapter. The chapter ends with a summary of the hypothesis testing.

Chapter 6: Discussion
In this chapter we will use the theoretical frame of reference to support the analysis and discussion of the findings. First, we will give a brief summary of the results from the empirical findings. Thereafter, the findings will be interpreted in the light of the dividend irrelevance theory. Next, we will discuss the signaling theory in relation to the results. Followed by discussion and interpretation of the findings based upon the agency theory, the bird-in-the-hand hypothesis and finally the clientele effect.

Chapter 7: Conclusion
This chapter revisits the research question and concludes upon it. This is followed by concluding comments on how the research purpose is met, the research gap is filled and what the contribution of the research is. Finally, we provide several suggestions for further research.

Chapter 2 – Research Methodology

In this chapter, we will introduce the theoretical methodology for the research. It starts off with an introduction of the choice of subject and our preconceptions, thereafter we highlight the research philosophical positions followed by a description of the research approach, research method and research design. In the end of the chapter, we will introduce the sources of literature and data and discuss the reliability and validity of the study. Finally, the chapter will end with a brief summary of the theoretical methodology.

2.1 - Preconceptions and Choice of Subject

Both authors of this research paper are students in the International Business Program at Umeå School of Business and Economics. Consequently, we have studied finance courses both on bachelor and master's level and have therefore gained valuable theoretical knowledge of financial theories referenced within this study. Both authors also have international experience of finance from exchange studies as well as internships abroad in Europe and the U.S which has given us widened perspectives on financial matters and appropriate language skills.

For our thesis we have selected to study the field of finance. The main reason for this is because both authors have the most developed knowledge within this specific area of business administration. Moreover, both authors also have a genuine interest for the field of finance, especially in financial markets and corporate finance and are aiming for careers within this area. These factors facilitated our choice of subject as they contributed to the development of our criteria for research questions. Based on these criteria, we came up with a few different research subjects. As a result of our knowledge and background in finance, the choice of studying the impact of cash dividend changes on stock return volatility as a research subject therefore fell quite naturally for us.

There are many dimensions such as epistemological and ontological issues that can influence the conduct of research, and many of them will be discussed in below sections. Moreover, we are aware that also personal values, stemming from the researcher's beliefs, feelings and experiences can affect the research. It is difficult to keep a research study completely free of values, however, it is important that the researcher limits the entering of values into the research process and attempts to be objective. The interpretations a researcher makes can be influenced by prior existing knowledge, the experiences and the attitudes of the researcher. (Bryman and Bell, 2011, p.30).

Subsequently, we want to bring forward our pre-conceptions. As mentioned, both authors have studied finance on both bachelor and master's level which has given us the underlying knowledge of the theories that are utilized within the research. We are aware that our previous experiences, both working and educational, might influence our study. However, the awareness of this fact together with the fact that we are conducting a quantitative research, based on statistical analysis on objective data, helps us staying objective through the research. Furthermore, building the conclusion and results on generalizable empirical findings highly limits the amount that our pre-conceptions influence the research.

2.2 - Methodological Positions

When conducting a research it is of essence to consider the research philosophical stances that underlie the particular study. This is because the positions taken on these issues will depict the way the authors regard knowledge and how they are going about to study the social reality. Consequently, these views will influence the research process. (Flowers, 2009, p. 1). The two major methodological positions that need to be decided on concern the epistemological and the ontological issues. These issues, and the stance we take in them will influence the process of our research and will therefore be discussed below.

2.2.1 - Epistemological Positions

Epistemology can be explained as a theory of knowledge and it concerns the issue on what can be respected, or considered, as acceptable knowledge in any field of study (Bryman and Bell, 2011, p.714). The main concern within epistemology is how to study the social reality. Specifically, if the tools, principles and procedures used when studying the natural sciences can be used to study the social reality as well. A researcher that emphasizes the need of collected hard data, which would be seen as more objective, is likely to study the world according to the natural sciences. Whereas a researcher who is more concerned with the feelings and attitudes of the research subjects studies social reality differently. (Saunders et al., 2009, p.112-113). Based on this, there are two main opposing positions within epistemology that explain how knowledge should be acquired and evaluated, to be regarded as acceptable knowledge. These two epistemological positions are positivism and interpretivism. (Bryman and Bell, 2011, p.15-16).

Positivism is the epistemological position that proposes that the principles and procedures of the natural sciences should be used when studying the social reality. Bryman and Bell (2011, p.15) list five principles of positivism, these are:

1. Phenomena must be confirmed by one's senses to be interpreted as knowledge

2. Hypotheses should be generated from theories and empirically tested so that new explanations and laws can be derived

3. The foundation for laws is provided by the collection of facts, which creates knowledge

4. Values should not affect the conduct of science, in other words, science should be conducted in an objective manner

5. Normative statements and scientific statements are clearly distinguished between (as the true- or falseness of normative statements cannot be confirmed by the senses this fifth principles is also implicitly expressed in the first principle)

In contrast to the stance of positivism is the epistemological position of interpretivism. Within this stance, the subject matters of natural sciences and of social sciences are viewed as so fundamentally different that they cannot be studied with the same principles and procedures (Flowers, 2009, p.3). Bryman and Bell (2011, p.17) explains interpretivism as being "...*predicated upon the view that a strategy is*

required that respects the differences between people and the objects of natural sciences and therefore requires the social scientists to grasp the subjective meaning of social action." Therefore, taking an interpretative stance implies that the researcher focuses on understanding the different realities of different social actors.

Our research question is concerned with the relationship between changes in cash dividends and stock return volatility for firms listed on NASDAQ OMX Stockholm. Furthermore, we only regard knowledge as acceptable as long as it can be proved by empirical findings. Therefore, on these grounds, it must be argued that we take the epistemological position of positivism in our research process. Consequently, we will collect historical data that later will be analyzed by the help of statistical tools to be able to examine the impact cash dividend changes might have on stock volatility. Our hypotheses are generated from existing theories and these hypotheses will be tested with a scientific approach, as to be able to objectively accept or reject these hypotheses.

2.2.2 - Ontological Positions

Ontology is the "*...theory of the nature of social entities*" (Bryman and Bell, 2011, p.716). It describes the view one takes on the nature of reality, whether one view it as an objective reality that actually exists or a subjective reality made up in our own minds (Flowers, 2009, p.1). In other words, the question ontology is concerned with is whether social entities are stemming from social actors' perceptions and their actions. Or, if social entities actually have an external reality apart from social actors (Bryman and Bell, 2011, p.20). Just as there are two opposing positions within epistemology there are two opposing positions within ontology, namely objectivism and constructionism.

The stance of objectivism within ontology implies according to Saunders et al., " *how social entities exist independent of social actors*" (2009, p.110). In other words, social actors are not giving meaning to social phenomena, rather these social phenomena have a reality that is external and not dependent on social actors. Take the example of a social entity such as a business organization. It could be treated as a tangible object because it has rules, regulations, procedures, a mission statement et cetera. These features also exert some power over the individuals who inhabit the organization as they need to respect the rules, regulations and procedures of the organization and they need to work towards the mission statement. If they do not do so they risk losing their job. Therefore, it could be seen as the organization having an external reality away from the individuals inhabiting it. In this way, the organization has an objective reality since it has characteristics of an object. (Bryman and Bell, 2011, p.21).

Contrary to the ontological position of objectivism is the position of constructionism, or the subjectivist view (Saunders et al., 2009, p.111). This position implies that social actors, through their actions and perceptions, are the ones creating social phenomena and their meaning. Therefore, social reality is dependent upon social actors. (Bryman and Bell, 2011, p.22). This view explicitly contradicts the position of objectivism. To go back to the example of the organization, within this position of constructionism it would be argued that the organization in itself does not have an objective reality. This position would rather argue that the characteristics of the organization are dependent upon the social actors working within it, and that the organization's characteristics were constantly being in change due to everyday interaction between the social actors. (Bryman and Bell, 2011, p.21).

The conclusion of this study will be based on objective results. The research will be based on historical data and statistical analysis will be conducted to be able to answer the research question. Taking the ontological position of constructionism would clearly bias our conclusion, as we would then have to include subjective interpretations and our own perceptions of the matter. Accordingly, our ontological stance is objectivism. The data we will be using for the research is secondary data, gathered by other actors before the time of our research, and therefore, independent of our research. The conclusions drawn by the end of this research study will be objectively based on the analysis of the data.

2.2.3 - Paradigms

In order to comprehend the epistemological and ontological assumptions of the research we can describe them through the use of four competing paradigms. Guba and Lincoln define the paradigms as "*...the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and empistemologically fundamental ways.*" (1994, p.105). These paradigms reflect the assumptions made about how researchers regard the nature of the social reality and how they intend to study it (Bryman and Bell, 2011, p.24).

Each paradigm includes the assumption of either *objectivist* (an external viewpoint of the organization is possible) or *subjectivist* (the organization is constructed by social actors, and it can therefore only be comprehended by actors involved in it). Furthermore, each paradigm also includes consideration on what the purpose of scientific research should be, and the assumption is made of either *regulatory* (purpose is to describe organizations, not to make judgments of them) or *radical* (the purpose of research is to make judgments and make suggestions for improvement). Four paradigms can then be identified by plotting these assumptions on two axes. (Bryman and Bell, 2011, p.24):

Assumptions:	**Objectivist**	**Subjectivist**
Regulatory	Functionalist	Interpretative
Radical	Radical Structuralist	Radical Humanist

Figure 1- The four paradigms

Source: Bryman and Bell, 2011, p.24

This research takes the paradigmatic position of "functionalist" because the assumptions made are objectivist and regulatory. The functionalist paradigm is the most common framework for research and it is founded on a problem-solving attitude, in turn leading to rational explanations (Bryman and Bell, 2011, p.24). This means that we are viewing the organizations from an external viewpoint and furthermore, the purpose of our business research is to describe what is happening when firms change their dividends, it is not to make any judgments of it.

2.3 - Research Approach

Following the research philosophical questions comes the methodological question. How will the researcher attempt to find out what this researcher believes can be

known? The answer to this question is dependent upon the choices made regarding the ontological and epistemological question. (Guba and Lincoln, 1994, p.108). In order to build a base on which you can develop your research, you conduct a critical literature review. The reason as to why you review the literature does however depend on which research approach you are using. (Saunders, 2009, p.61). Furthermore, the approach one would use to conduct a research varies depending on what kind of research is to be conducted. There are two kinds of research approaches to be considered: the deductive and inductive approach (Bryman and Bell, 2011, p.11). The deductive approach is often used in combination with a quantitative study while an inductive approach is used when conducting a qualitative study (Bryman and Bell, 2011, p.13).

When a researcher uses existing theories to generate a hypothesis, a *deductive* research approach is used. The deductive approach is how the relationship between theory and research is most commonly looked upon. When using this approach, the researcher starts off by using existing theories in order to build a hypothesis. This hypothesis is then tested, using empirical findings. Then finally, the hypothesis is accepted or rejected and the theory revived. (Bryman and Bell, 2011, p.11). That is, the literature is reviewed in order to find theories that later will be tested (Saunders, 2009, p.61). The *inductive* approach on the other hand is when researchers use their observations and findings to build their own theory. That is, the researcher observes data and finds patterns or other evidence from which they can develop a theory. (Bryman and Bell, 2011, p.13). In the inductive approach, the literature review is rather conducted in order to connect to the researchers own theory (Saunders, 2009, p.61).

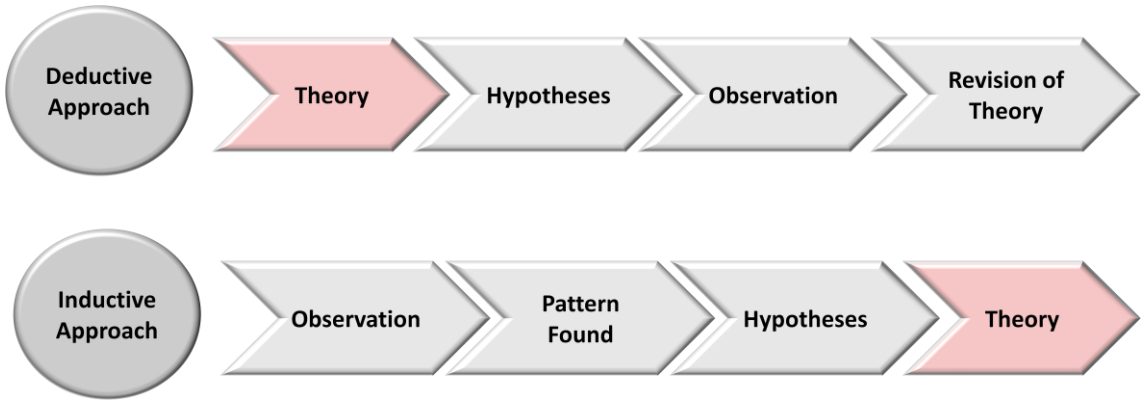

Figure 2 - Deductive and Inductive Process

Source: Bryman and Bell, 2011, p.11

In our study, we are using existing theories to generate hypotheses that will be tested by conducting an empirical study. Furthermore, we are looking at the relationship between two very common concepts, the cash dividends and stock return volatility that have been studied extensively before. Since they have been studied extensively, we are not building a new theory, but rather using old theories to generate hypotheses. There are previous studies that have been conducted in a similar area that we are concentrating on in our research. Using these previous studies, we are generating hypotheses that we aim to answer by observing and analyzing numerical data and literature. Therefore, we have chosen a deductive research approach for our study.

2.4 - Research Method

Lee (1992, p.88) argues that what is being studied can partly be answered by how it is being studied. That is, by the choice of method. There are two fundamental research methods to choose between when conducting a research: quantitative and qualitative research methods. Lee (1992, p.87) further mentions that the quantitative and qualitative methods consist of two different approaches. These approaches are based upon the different research philosophical assumptions and paradigms. Along the arguments of Lee, Barnham also states that these two methods have different underlying approaches and that the relative aims of the methods differs (2012, p.736). A common view as to how quantitative and qualitative research differs is that quantitative research is concerned with numbers while qualitative is more focused on words (Bryman and Bell, 2011, p.386). There are however more differences between these two methods.

As mentioned before, the qualitative study is used when new theories are to be generated. That is, when an inductive research approach is used. For a quantitative study, it is more often rather about testing a theory than developing a new one, using a deductive approach. (Bryman and Bell, 2011, p.27).

The quantitative research can be described as *"…a research strategy that emphasizes quantification in the collection and analysis of data…"* (Bryman and Bell, 2011, p.26). Hyde (2000, p.84) further explains that the quantitative research is less focused on details, and more on generalizing sample characteristics. That is, in a quantitative research method, a large sample is often used to draw general conclusions of the population that is studied. Before it has been analyzed and turned in to information, quantitative data is not very interesting for most people. Statistics, graphs and charts are examples of techniques that can help the researcher turn quantitative data into something meaningful. (Saunders, 2009, p.414)

The qualitative research is, as already mentioned more concerned with words. The fact that numbers are not used as much in qualitative research is, according to critics, however not what distinguishes it from quantitative research. Furthermore, an epistemological position of interpretivism is often an important feature in qualitative while quantitative researches take on a more natural scientific model, specifically the position of positivism. Finally, the ontological position of constructionism is one feature that is common for qualitative research. (Bryman and Bell, 2011, p.386). Whereas a quantitative research method often includes a more objectivistic ontological view (Bryman and Bell, 2011, p.27). Hyde (2000, p.84) further describes the qualitative research method as focusing on details rather than making generalizations. The sample that is used is rather small but the data that is collected is very detailed. It should be beheld that these are the most common features of these research methods, but deviations can occur. Quantitative research does for example not always take the deductive approach and so on.

Quantitative and qualitative researches are often compared to each other and so are their differences. This often leads to the faulty assumption that qualitative research is what quantitative research is not. (Bryman and Bell, 2011, p.387). Allwood (2012, p.1417) recognizes that these methods are commonly being compared. However, he argues that signs declare that the value of the distinction between quantitative and qualitative research is very limited.

Although quantitative and qualitative studies are clearly not the opposite from each other, it is interesting to look at how they contradict the most. The table presented below will show a clear line-up with the fundamentals of each method and at the same time show how they are commonly viewed upon as distinctive.

Quantitative	Qualitative
Numbers	Words
Point of view of researchers	Point of view of participants
Researcher distant	Researcher close
Theory testing	Theory emergent
Static	Process
Structured	Unstructured
Generalization	Context understanding
Hard, reliable data	Rich, deep data
Macro	Micro
Behavior	Meaning
Artificial setting	Natural setting

Figure 3 - Differences in Research Methods

Source: Bryman and Bell, 2011, p. 410

In our research, we are concerned mainly with numbers as we will investigate the relationship between changes in cash dividends and return volatility. There are no other participants present in the study, therefore only the point of view of the researchers will be presented in the study. Furthermore, we are generating hypotheses from existing theories rather than developing our own theories. That is to say, we are using a deductive research approach. Moreover, we are taking the epistemological position of positivism and the ontological position of objectivism in our research process. The research will be structured and test the behavior of return volatility as cash dividend changes and the findings will be generalizable. Looking at these features that describe the quantitative and qualitative methods, we can conclude that almost all features in the quantitative method can be used to describe our research strategy. Additionally, the underlying nature of our research question implies that it can only be answered through a quantitative study.

2.5 - Research Design

The research design explains how data will be collected and analyzed. The research design is also revealing how the researcher will allocate his/her priorities in the research process (Bryman and Bell, 2011, p.40). More generally, the research design can be explained as how the researcher is planning to go about to manage to answer the research question (Saunders, 2009, p.136). These are the five most common research designs:

- Experimental design: Experimental design is what is used when the research includes experiments of any kind. Experimental researches such as field experiments are not often conducted in business research. Experimental research, when conducted is however very trustworthy and the internal validity especially is very strong. (Bryman and Bell, 2011, p.45).

- Cross-sectional design: In this design, quantitative or qualitative data is collected on two or more variables at a specific point time. Thereafter, the data is analyzed for patterns. (Bryman and Bell, 2011, p.53). This design can be thought of as taking a snap-shot at a point in time (Saunders, 2009, p.155)

- Longitudinal design(s): In business and management research, longitudinal design is used to find and plot changes. The data is collected at more than one point in time. In this way, the variables' time order are illuminated and therefore, the prospects of making causal inference are high (Bryman and Bell, 2011, p.57-58). The longitudinal design is the design with the best capacity to study changes over time (Saunders et al., 2009, p.155).

- Case study design: Case study design is used when a single case is examined in detail. For example, it could be the study of a person, a single organization, a single event etc. This is a very commonly used design in business research (Bryman and Bell, 2011, p.59-60).

- Comparative design: Comparative design is used when examining two or more opposing cases using similar methods. *"This design is used to understand a social phenomenon better as its relation to contrasting cases is compared"* (Bryman and Bell, 2011, p.63).

The design that we are primarily using in our research is the longitudinal design. We are however including some cross-sectional elements as well. The foremost reason as to why we are using a longitudinal design is because of the fact that we are examining the sample on more occasions than just one. That is, we are collecting data over a five year time period (2007-2012) to see if a change in cash dividends causes stock return volatility to change. This is because we want to study if there has been a change in stock volatility over time caused by changes in cash dividend payments. That concludes that our study cannot be solely cross-sectional, but rather longitudinal with some influences of cross-sectional elements. The cross-sectional elements of the research design arise when we examine if firms of large sizes show a different result than firms of smaller sizes. That is, if there is a difference between large caps, medium caps or small caps on NASDAQ OMX Stockholm.

2.6 - Literature and Data Sources

When the appropriate research method has been chosen the type of data and from what sources these data should come from need to be determined. Literature sources can be categorized into three groups of sources: primary, secondary and tertiary (Saunders et al., 2009, p.69). *Primary literature* is referred to as a source of work that appears for the first time, such as planning documents. *Secondary literature* is what is published following the primary literature, such as journals or books. Finally, *tertiary literature* refers to a source that either introduces concepts or help with the search of primary and secondary research, for example databases or encyclopedias. (Saunders, 2012, p.83) For this research secondary sources such as books, academic journals and official data from databases have been utilized.

Specifically, for the theoretical framework and literature review we have accessed published articles within academic journals through Business Source Premier and Emerald which in turn have been accessed through Umeå University's library. Additionally, some articles that were not accessible through the databases provided by Umeå University's library were found through Google Scholar. Main keywords include: *dividends, dividend policy, dividend irrelevance theory, agency theory, signaling theory, bird-in-the-hand hypothesis, clientele effect, volatility, implied volatility, historical volatility, asymmetric volatility, beta and risk-return.*

The numerical data necessary to conduct this research and answer the research question were gathered through Thomson Reuters DataStream.

The use of secondary sources for research has many benefits, but as always, some drawbacks as well. The advantages of using secondary data includes saving in on cost and time. Using secondary data offer the possibility of access to high quality data in an instant, whereas collecting the data oneself would be much more time-consuming and costly. Subsequently, there is more time for data analysis. Furthermore, official data are usually of high-quality which provides reliability of the data set. Secondary data also provides the opportunity for longitudinal analysis. Longitudinal analysis would be extremely time-consuming if the researcher would base the study on primary research, however, using already collected data is significantly less time-consuming. (Bryman and Bell, 2011, p.313-320).

The drawbacks of utilizing secondary sources need also be considered. A possible limitation could be the hardship of becoming familiar with the data. Moreover, the data can have a high degree of complexity, specifically due to the volume of data. The management of the information can therefore be difficult. A last limitation could be that the researchers have no control over the quality of the data, if the data is not collected from regulated sources. (Bryman and Bell, 2011, p. 320-321).

Although these limitations might be a problem in some cases, for this study we find that these drawbacks are not affecting our research negatively. The data we need to collect for the conduction of this research are the stock prices of the firms listed on NASDAQ OMX Stockholm between the years 2007-2012 and the amount of dividends paid each year. This information will be easy to access through Thomson Reuters DataStream provided by Umeå University's library. Moreover, we will be familiar with the data, as the only data we need are stock prices and dividend payments for this research. Finally, the sources should be trustworthy as we are gathering data from Thomson Reuters which is one of the world's leading financial information providing companies.

Due to these arguments we find that the use of secondary sources for this research study matches our research question. We find only advantages with utilizing secondary sources and the possible limitations are overcome by the nature of the research question.

2.7 - Validity and Reliability

Reliability and validity are two of the most important evaluation criteria for business research. If the research does not have reliability and validity, it is more or less worthless. In order to show that our research fulfill these criteria we will here examine

the reliability and validity of our research as well as explain these concepts more in-depth.

Reliability refers to whether it would be possible to repeat the exact same study and get the same result. Reliability is especially of concern for a quantitative research. (Bryman and Bell, 2011, p.41). Three factors are important when deciding whether a research is reliable: Stability, internal reliability and inter-observer consistency. Stability concerns whether the results changes over time or if the same study would generate the same result if it was conducted in another point in time. By internal reliability it is meant that whether there are consistencies in the indicators that form the scale. And inter-observer consistency is concerned with the consistency of the observer's decision. (Bryman and Bell, 2011, p.158).

Validity on the other hand refers to "*the integrity of the conclusions that are generated from a piece of research*" (Bryman and Bell, 2011, p.42). In other words, validity can be described as whether the indicator that is supposed to measure a concept is the right one (Bryman and Bell, 2011, p.159). Saunders et al. argues that validity is present when the results are what they appear to be (2009, p.157). There are two types of validity: internal and external. *Internal validity* is concerned with causality. It is saying that for the research to be valid, the researched variable, and not some other variable, have to be what is causing the result. For example, if we believe that B is caused by A, can we be sure that A is what is causing B, and not some other variable that makes it look like B is caused by A? *External validity* on the other hand is more concerned with generalizability. It is questioning whether the results can be used outside this research context. Researchers want to come up with representative samples and the external validity is the reason why. (Bryman and Bell, 2011, p.42-43).

We can conclude that our research is repeatable and that the same results will be found if the exact same study is conducted again. That is foremost because the indicators we have used to conduct our research (cash dividend and stock return volatility in 2007-2012) do not change over time. There is also consistency among observers since we are only interpreting what we find through our statistical tests and do not base anything on our own assumptions. Furthermore, the data that is collected is done so by the use of the reliable Thomson Reuters Datastream and the annual reports of the firms. The relationship between dividend and volatility is measured using tests within SPSS, which is a well known and reliable statistical program.

When it comes to internal validity, what we are studying is whether it really is the change in cash dividend that is causing the volatility or if it is some other variable. If we find that volatility is affected by change in cash dividends we can conclude that there is a causal relationship between these two variables. As for external validity, we are focusing on the Swedish stock market, but our result may very well apply to other countries with similar market condition, hence, there is external validity.

2.8 - Ethical and Social Issues

In research there can arise many ethical issues. As ethical issues have an impact on the integrity of research studies (Bryman and Bell, 2011, p.122) the possible, relevant ethical and societal issues for this particular study must be discussed.

Diener and Crandall argues that ethics are guidelines that facilitates researchers in their quest for upholding values and the making of the goals of research to conform to values. More than just prohibiting scientists in their research, ethics also support responsibilities of a positive nature. (Diener and Crandall, 1978, p. 3). Furthermore, Diener and Crandall (1978, p.17-96) list four main areas of concern for ethical issues, these are *informed consent*, *harm to participants*, *invasion of privacy* and finally *deception*. However, these possible ethical issues are mainly related to qualitative studies and as such are not of relevance for this paper. Specifically, these implications arise due to the relationship between the researchers and the research participants, which in our research is not applicable as there are no research participants within the study.

Diener and Crandall (1978, p. 151-152) also goes on to highlight the importance of honesty and accuracy of the researchers. They mention that researchers can often feel tempted to alter or fake the data because of the urge to produce significant results (Diener and Crandall, 1978, p. 152). We, the authors of this study, are well-aware of the devastating effects that dishonesty and non-accuracy can have on science. Consequently, we have no motivation to falsify the data or reporting only certain findings. The collected data for this research will be available for the public upon request, as such the collected data is available for control at any time which help to assure that the data is accurate and has not been faked.

Moreover, issues of affiliation and conflict of interests, data management and copyright are of relevance to discuss for this research. The collected data will stem from official databases providing us with the secondary sources necessary for the conduction of this research. The data that will be used in this research are data that is published in scientific journals, databases and annual reports, available for the public. Therefore, we deem the issue of copyright to be small for this particular study as the data used is public material.

The ethical concern of data management mainly refers to the questions whether collected data is being used for the research purpose or, perhaps if it will also be used for some other reason that is not mentioned (Bryman and Bell, 2011, p.139). However, our research study has a deductive approach with a quantitative research method. As such, it should be clear that the result of the research will be based upon the statistical analysis of the collected data. In effect the use and management of the collected data is clearly presented in the form of empirical, generalizable findings.

Finally, we have no affiliation with any organization for sponsoring or funding for this study, it is completely independent. As such, we have no outside interests that want to influence the presentation of our findings. Therefore, we regard the study to be free of conflict of interests and issues that could arise due to affiliations. This issue is also related to the questions of honesty and we argue that as we have no affiliations or outside interests we are not interested in reporting only certain findings, nor falsifying the data in order to present specific findings.

Additionally, following the above standing arguments and the fact that both authors have studied several courses including elements of ethical considerations in research we argue that we have the appropriate knowledge to conduct a research study following ethical principles. Moreover, based on this we argue that our research has

integrity and that it is based on objectivity rather than being influenced by possible self-interest or outside affiliations.

This research could also contribute in a societal manner. By delivering new knowledge and therefore making people, specifically investors and company management more aware of the relations between cash dividends and stock return volatility on the Swedish stock market. For both investors and company management this would be relevant knowledge. Consequently, society benefits from knowing whether companies paying stable, regular dividends are more or less volatile than firms that have a higher degree of changes in cash dividend payments as this will increase knowledge for investors in making investment decision and management when setting dividend policy.

2.9 - Summary of Theoretical Methodology

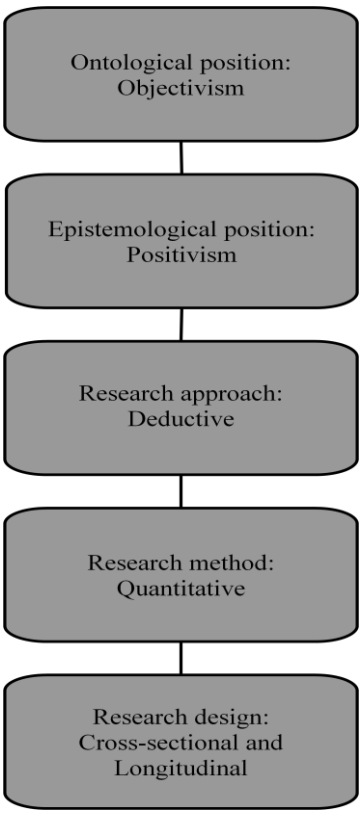

Figure 4 - Theoretical Methodology

Source: By the Authors

To sum up the theoretical methodology we decided to include a figure to make the chosen methodology more graphic and clear for the reader. The underlying methodological assumptions for the research process are the objectivistic stance within ontology, and the epistemological position of positivism. These assumptions imply that we view the social reality as having an external reality independent of social actors, therefore we see reality from an objective view. Moreover, it means that only knowledge that can be confirmed by empirical findings will be regarded as acceptable.

The study will have a deductive research approach, as the main objective of the research is to test hypotheses that have been built on existing theories. Furthermore, due to the underlying nature of the research question, the quantitative research method is the natural choice for the conduction of this study. Moreover, the chosen research design is foremost longitudinal, however some elements of the cross-sectional design are also included.

Chapter 3 – Theoretical Framework

This chapter will cover theories and the result of previous similar studies that are relevant for our research. The chapter starts with an introduction of NASDAQ OMX Stockholm, followed by an overview of the dividend irrelevance theory. Thereafter, we will introduce several dividend relevance theories including Signaling Theory, Agency Cost Theory, Bird-in-the-Hand Hypothesis as well as the Clientele Effect. We will continue the chapter by introducing important concepts for our research such as risk-return, volatility, beta and standard deviation. Finally, we will end the chapter with an overview of previous similar studies that are of relevance for our research.

3.1 - NASDAQ OMX Stockholm

NASDAQ OMX Stockholm AB, commonly known as the Stockholm Stock Exchange, is the official stock exchange in Sweden where trade of securities occurs. NASDAQ OMX Nordic includes the stock exchanges of Helsinki, Copenhagen, Stockholm and Iceland. The Stockholm Stock Exchange merged with OM (Optionsmäklarna) in 1998 creating the OM Group. After a merger with HEX, OM Group changes its name to OMX in 2004. In 2007 NASDAQ acquires OMX, creating the NASDAQ OMX Group. Since 2008 NASDAQ OMX Group has been the owner and operator of the Stockholm Stock Exchange. (NASDAQ OMX, 2013).

The number of listed firms on NASDAQ OMX Stockholm fluctuates from year to year. Number of stocks is a bit more than the number of firms, as several firms have both A and B shares listed. As of today there are a total of 291 listed stocks on the stock exchange. They are divided into three segments depending on the size of the company measured by its market capitalization, ranging from small cap to mid cap to large cap. Firms listed in the large cap have a market capitalization of over 1 billion euro and currently this segment consists of 84 stocks. In mid cap firms with a market capitalization between 150 million to 1 billion euro can be found, today there are 75 stocks in this segment. Finally, small cap firms have a market capitalization under 150 million euro, and this is the largest segment with currently 132 listed stocks. (Avanza, 2013).

As our research is focused on the Swedish market it was natural to choose to look at NASDAQ OMX Stockholm which is the main market place for the majority of listed firms in Sweden.

3.2 - Dividend Irrelevance Theory

In 1961 Modigliani and Miller published their article on dividend policy in which what has become known as the dividend irrelevance theory was first presented. More than 50 years has passed since then but the theory still holds ground as it became one of the paradigms regarding dividend policy discussed in every textbook in corporate finance. The theory implies that in a perfect capital market with rational investors the dividend policy have no effect on share price, the firm's cost of capital or shareholders' wealth. They argue that *"...given a firm's investment policy, the dividend payout policy it chooses to follow will affect neither the current price of its shares nor the total return to its shareholders"*(Miller and Modigliani, 1961, p.414).

The dividend irrelevance theory rests upon a few assumptions. These include:

- *Perfect capital market*: all actors on the market have free and equal access to all relevant information (no agency costs), the market value of a security can never be impacted by one single actor as the actor cannot be that large. Furthermore, there are no transactions costs such as brokerage fees and there are no taxes. (Miller and Modigliani, 1961, p.412).

- *Rational behavior*: investors always prefer more wealth to less but they are indifferent to whether they gain extra wealth in the form of capital gains or dividend payments. (Miller and Modigliani, 1961, p.412).

- *Perfect certainty*: all participants on the market have the same information and knowledge "*...as to the future investment program and the future profits of every corporation*" (Miller and Modigliani, 1961, p.412). Therefore, they argue that no distinguishing between bonds and stocks as financing sources need to be made. Consequently, they assume that there is only one financial instrument, stocks. (Miller and Modigliani, 1961, p.412)

According to Modigliani and Miller a firm's investment decisions are independent of its dividend policy since firm value is determined by the availability of NPV-positive projects (1961, p.418). In other words, share value can only be increased by income from NPV-positive projects, and not by how that income is distributed. That is to say, future cash flows from investment activities are the determinant for firm value, given the assumptions for a perfect capital market. For example, a firm chooses to retain earnings one year and invest it in positive NPV projects. Furthermore, the investors are fully aware of this, in other words, there is perfect certainty about the investments and that it will generate larger dividends in the future. Because of this, share value would not decrease. (Arnold, 2008, p.843).

Furthermore, it is also argued that to investors the effect of dividend policy will in the end be the same no matter the policy since investors will create their "homemade dividends". As the underlying assumptions include that there are no taxes or transaction costs, investors that require a dividend can choose to sell a portion of their shares which would then have the same effect as receiving a dividend from the firm. For example, by selling 1 % of shares an investor creates a homemade dividend. Or vice versa, if investors prefer less dividend, the distributed dividends can be used to buy additional shares. Therefore, an investor would not willingly pay more for stocks distributing dividends. (Arnold, 2008, p.842). Accordingly, investors are indifferent to firms' dividend policies.

The dividend irrelevance theory has since its introduction stood ground for much research on dividend policy. The theory has both been supported and rejected by recognized financial academics over the years. Black and Scholes (1974) found when investigating the effect on dividend policy on stock prices empirical evidence in support of the irrelevance theory. They stated that "*...we have been unable to show that differences in dividend yield lead to differences in stock returns. This implies that we are unable to show that dividend policy affects stock prices.*" (Black and Scholes, 1974, p.18). On the other side, evidence against the theory has also been found. Ball et al. (1979) was inspired by the study by Black and Scholes and conducted a similar study on the Australian market. However, their results did not indicate support for the

irrelevance theory. Qualitative studies has also been made, most significant is perhaps Baker et al. (1999). In this study 90% of 603 surveyed CFOs of NYSE-listed US firms thought that dividend policy both affected firm value as well as the cost of capital. (cited in Al-Malkawi et al. 2010, p.177).

As written above, the dividend irrelevance theory is based upon several assumptions of a perfect market. However, it is difficult to find a perfect capital market in practice today. To apply the theory in reality is therefore difficult. In this study the Swedish market will be analyzed, which we must regard as an imperfect capital market as most markets can be regarded as. Where we can neither assume that investors are perfectly rational or that perfect certainty exists. However, the theory is still so fundamental that it comes naturally to analyze our findings in the light of this proposition. As we are going to test the relationship between changes in dividends with stock return volatility, our results can shed some light on whether dividends are relevant for firm value, when the market is not perfect.

Contradicting the dividend irrelevance proposition, there are several other theories that explain why dividend policy matters and why it is relevant. If dividend policy is relevant for firm value, then it might be related to investment and financing decisions. If that is the case, then why dividend policy matters have many explanations. (Al-Malkawi et al. 2010, p.177).

3.3 - Dividend Relevance Theory

On the contrary to Miller and Modigliani's dividend irrelevance theory are a great amount of theories and empirical work arguing for the relevance of dividend. Taxes, information asymmetry and conflict of interest are all things that work as a foundation for the relevance theories (Crutchley and Hansen, 1989, p.36). These theories are built on the notion that there are always some imperfections in the capital market.

Our research will be conducted in order to see if changes in cash dividend can affect stock return volatility, and if that is the case, we could argue that dividend decisions are of relevance. Below, we will introduce theories that argue for the relevance of dividends. These theories might, if we find a relationship between changes in cash dividends and changes in stock return volatility, be the reason for this relationship and is therefore of crucial importance for our research. All dividend relevance theories will be explained more in-depth below.

3.3.1 - Signaling Theory

One of the most widespread dividend relevance theories is the signaling theory. The theory hypothesizes that managers use dividends as a mean to try to convey their beliefs about the company's future earnings. (DeAngelo et al., 1996, p.342). That is, a high dividend is seen as an indicator of a bright future whereas a lower dividend indicates a poorer financial performance in the future.

Bhattacharya (1979) was one of the first to publish an article about the signaling theory. In his articles from 1979, he develops a model where, in an imperfect-information situation between management and shareholders, cash dividend signals a firm's expected cash flow. As mentioned, he assumes that outside investors do not have access to all information about the firm. Furthermore, he also stated that in comparison to capital gains, dividend is more highly taxed. Because of these two

conditions, the firm's expectations about future cash flows can be signaled by the amount of dividends paid out. (Bhattacharya, 1979, p.259).

Dionne and Ouederni (2011 p.188) argues that the signaling theory suggests *"…a positive relationship between dividend policy and information asymmetry".* That is, the more asymmetric information there is, the more sensitive the investor is to dividend changes. Furthermore, they argued that one of the imperfections in the market that could possibly make it beneficial to hedge is when investors and managers do not have access to the same information. That is, when information asymmetry is present. In their study, they examine risk management and the dividend signaling theory. They found that the more an investor hedge future cash flows, the less the investor care about the information that dividend changes contains. (Dionne and Ouederni, 2011, p.193). That is, the more they can hedge against losses of future cash flows, the less they care about dividend changes and the information that may be content in these changes.

Al-Malkawi et al. (2010, p.186) mention that for this signaling hypothesis to hold, two criteria have to be fulfilled:

1) Managers have to have information that shareholders do not have and be planning on conveying it to the market Al-Malkawi et al. (2010, p.186)

2) Companies are unable to send false signals. That is, a company with poor future prospects cannot send a signal to the market that they have good future prospects Al-Malkawi et al. (2010, p.186)

It is commonly assumed that a dividend increase often lead to higher stock prices, while a decrease often leads to lower stock prices. Miller and Modigliani (1961) argue that it is not because of the preference for dividends itself that stock prices changes after an increase or decrease in dividends. Rather, it is because investors believe that the dividends mirror the future retained earnings (Miller and Modigliani, 1961, p.430). It is however hard to conclude whether the stock prices changes because of the signaling effect or because of both the signaling and the preference for dividends (Brigham and Houston, 2009, p.460).

In Miller and Rock (1985 p.1037) it is discussed that previous researches by Watts (1973) and Gonedes (1978) have argued that past and current dividend can tell little about the future earnings. Miller and Rock (1985, p.1037) did however argue that dividend may indirectly convey information about future earnings. In Al-Malkawi's article it is argued that Miller and Modigliani agreed on the fact that share price may be affected by the amount of dividend, but they argued that it occurred only in imperfect markets. They did although not agree to the assumption that shareholders prefer dividend to retained earnings. (Al-Malkawi et al., 2010, p.186). The question of whether managers and shareholders have access to the same amount of information regarding a company's performance has been highly debated. In Al-Malkawi's article it is also conveyed that Miller and Modigliani are two of those who argued that the same information were as accessible for shareholders as for managers. This view is however criticized since managers usually hold information about prospects that shareholders cannot get any information about. Because of this gap between shareholders and managers, the stock price cannot be used as an indicator o the firm's value (Al-Malkawi et al., 2010, p.186).

DeAngelo et al. (1996, p.369-370) examined the signaling effect and the manager's decision for dividends for 145 NYC companies that had faced a decline in earnings after at least nine years of growth. Their study showed that even though most companies raised their dividend amount, they faced a decline in earnings. Furthermore, testing the signaling effect in this earnings downturn, they found that the manager's dividend decision was not helpful for predicting the future earnings. They did also examine if companies that have a prospected bright future use dividend to signal their beliefs to their investors, but they did not find any evidence of this.

3.3.2 - Agency Costs

One of the basic assumptions of the dividend irrelevance theory by Modigliani and Miller is that there is no discrepancy between the managers of the firm and its shareholders. This can be questioned though, as there is a difference between management and the owners of the firm. Managers should act as agents of the shareholders, but often, the interests of managers differ from the interests of the shareholders. There is the risk that managers will take actions that will be of cost to the shareholders, such as investing heavily in activities that benefits the manager, but is unprofitable for the firm. (Al-Malkawi et al. 2010, p.190). The agency theory implicitly says that everyone tries to maximize his own utility, rather than maximizing firm value.

Jensen and Meckling (1976) published one of the most influential studies on agency costs and have since been heavily cited on the subject. Principals (shareholders) hire and give power to agents (managers) to maximize shareholder value. Agency costs, Jensen and Meckling said, are when shareholders (principals) find the need to monitor the behavior of the management (agents) because of discrepancy of interests. (Jensen and Meckling, 1976, p.308). This first article mainly describes the agency theory thoroughly but it does not elaborate on the effect of agency costs on dividend policy. However, they do argue that the potential conflict that could arise between share- and bondholders, as shareholders can be thought of as the agents of bondholders' funds, could be powered by dividend policy. In this way, dividend payments can be seen as shareholders depriving bondholders of wealth. (Al-Malkawi et al. 2010, p. 190).

Jensen (1986) stated that excess cash flow easily lead to agency problems because of differing interests between shareholders and managers. Free cash flow give managers more flexibility to maximize their own utility, such as engaging in empire building, and the risk of over-investment in bad investments below the cost of capital. He then pointed out that these agency costs between managers and shareholders could be reduced by dividend payments as it reduces excess cash flow, but also debt could be beneficial in the same way. (Jensen, 1986, p.323). With less funds available and controlled by managers there is less risk for over-investment in poor projects, and thus less agency costs.

Rozeff (1982) was the first to use a regression model to find the optimal dividend payout ratio to keep agency costs at a minimum. He found that there was a positive relationship between the dispersion of ownership and the dividend payout ratio. Therefore, dividends had a greater and more beneficial impact at reducing agency costs in firms that have a greater dispersion of ownership than compared to firms with less dispersion in ownership. (Rozeff, 1982, p. 257-258). These finding empirically supported the agency theory. Among several other scholars, Jensen, Solberg and Zorn also conducted statistical tests for the agency theory and their findings were in

consistency with the agency theory and also with Rozeff's findings (Jensen et al., 1992, p.261)

Easterbrook published in 1984 an by many appreciated article which supported the findings of Rozeff (1982) and Jensen and Meckling (1976). Following the lines of the latter, Easterbrook stated that there are mainly two sources of agency costs. The first is the cost of monitoring managers, which he argued should be done by a person "*...comparable to the bondholders' indenture trustee*" (1984, p.653) in order to increase shareholders' wealth. The second source is the risk aversions of managers because they often have much of their personal wealth invested in the firm. They therefore have more to lose than the shareholders and will be afraid of total risk in contrast to the shareholders who is holding diversified portfolios whom will only be concerned with systematic risk. Due to the risk aversion of managers it is likely that high yielding projects are rejected. Managers can in this way control the amount of risk by altering the debt to equity ratio, by decreasing the firm's amount of debt, risk is automatically decreased as well. This could be done through the dividend policy. (Easterbrook, 1984, p. 653).

Dividend payments can according to Easterbrook diminish these two sources of agency costs. Paying dividends implies that managers need to approach the capital market in order to raise new capital, and the investment professionals could therefore monitor the behavior of the managers. Both when issuing new securities or new debt, such as bonds, would the firm be scrutinized by an investment banker. In this way, managers who pay dividend more often need to raise funds in capital markets leading them be monitored. Which cause them to act more in the interests of the shareholders. (Easterbrook, 1984, p.655).

3.3.3 - Bird-in-the-Hand Hypothesis

The bird-in-the-hand hypothesis says that investors prefer to get dividends now instead of receiving future capital gains. That is because obtaining capital gains in the future is more risky than obtaining dividends now. (Brigham and Houston, 2009, p.459). The well known expression "bird-in-the-hand" or "two in the bush" refers to the choice of either dividends now or capital gains later. The bird in the hand hypothesis says that increasing dividend is associated with increasing the value of the company. That is because high dividends can diminish the uncertainty about future cash flow, the cost of capital can be reduced with a high payout ratio, which would increase the share value. (Al-Malkawi, 2010, p.177-178) Easterbrook (1984, p.651) argued that dividend worked as a hedge against a possible bankruptcy before all savings have been distributed to all shareholders. Shareholders prefer cash now rather than receiving a large amount when they cash out. That is also why companies pay dividend.

Gordon (1959, p.99). said that there were three different reasons to why an investor chooses to invest in a specific stock:

1) To gain both dividend as well as earnings
2) Primary to gain dividends but also the retained earnings in the future
3) Dividend is not relevant, the investor are looking for retained earnings only

Brigham and Huston (2009) bring up Miller and Modigliani arguments against this theory. Miller and Modigliani said that investors are indifferent as to whether they gained dividends or future capital gains. They argued that it is because investors are

likely to invest their dividends in the same, or a similar firm. Miller and Modigliani did also criticize the bird-in-the-hand hypothesis because they thought that the riskiness of the operating cash flow, rather than how a firm's earnings are distributed, is what decides the risk that the company is facing. Miller and Modigliani called their contradiction the "Bird-in-the-Hand-Fallacy". (Brigham and Houston, 2009, p.459). Bhattacharya (1979, cited in Al-Malkawi, et al., 2010, p.178) agreed with the bird-in-the-hand hypothesis being fallacious. He said that changing the amount of dividend that is paid out will not change the riskiness of the company. Rather, it is the riskiness of the company's cash flow that decides the amount of dividend that should be paid out.

3.3.4 - Clientele Effect

The clientele effect hypothesis says that investors can be divided into different clienteles based on their preferences for different dividend payout policies. Some clienteles of investors prefer a high and steady dividend payout while others prefer to have their dividends reinvested in to profitable projects by the firm and are therefore more attracted to stocks that do not pay out dividend at all. Shareholders that prefer cash income will be unhappy with companies that do not pay out dividends. To obtain a small cash income every year on a stock that does not pay dividend, they will have to sell off some stocks, which can be both costly and time consuming. On the other hand, shareholders that prefer reinvestments rather than dividends can avoid having to pay taxes and spend time on reinvesting their dividends and vice versa. From this, we can conclude that changing the dividend policy may upset clienteles who may have chosen to invest in a stock because the company's dividend policy was of preference for them. (Brigham and Houston, 2009, p.458-459). Allen et al. (2000, p. 2499) said that clientele effects occur when institutional investors are taxed less than individual investors. Dividend paying firms are more attractive to institutional investors because of this tax benefit.

Miller and Modigliani (1961, p.431) argued that even though companies may be able to attract different groups of shareholders (clienteles) by changing its dividend policy, no dividend policy is better than the other in a perfect market. They believe that dividend does not affect the value of the company, and therefore the dividend policy is not relevant.

Elton and Gruber (1970) examined two variables that they thought could affect the investor's choice to invest in a stock, the dividend yield and the payout ratio. They examined these two variables in order to see if there were signs of any clientele effects. The higher the dividend yield, the bigger part of the total return the stockholder is expecting in dividend and the lower the will the capital gain be. Companies with a high payout ratio are hypothesized to pay face a slower growth than those with a low payout ratio. They are therefore expecting the shareholders who are in the low tax brackets to prefer stocks that have a higher dividend yield compared to shareholders who are in the high tax brackets. (Elton and Gruber 1970. p.71). That is because investors have to pay more tax on dividends than they would if they were to get only the capital gain and no dividends. They found that many institutions are indifferent to dividends, but corporations, which pays a lower tax on dividend than on capital gains prefer a higher dividend. Moreover, they also found proof that shareholders in lower tax brackets are attracted by firms with lower payout ratios. They could therefore conclude that clienteles actually do exist. (Elton and Gruber 1970. p.72-73).

Graham and Kumar (2006, p. 1305) investigated clienteles among retail investors. They found that there is a relationship between income and age and dividends preference. Their study show that the older the investor is, and the lower income he/she has the more preferable dividend yield is. They also found that older investors and those with low income are most likely to buy stocks after announcements about dividends have been declared. There is also evidence that it is the older investors and those with low income are more often buying stocks before the day dividend is paid out. Finally, for small stocks, they found that the older the investor is, the smaller the ex-date price drop and the more income an investor has, the higher the ex-date price drop. Therefore, they could conclude that clienteles could be observed in their sample.

Dahlquist et al. (2012, p.5) examined the Swedish market in order to find out if there is a relationship between dividend yield and tax preferences. They identified four different tax clienteles in Sweden: tax-neutral investors, businesses and individuals, investment funds and partnerships (individual partnerships). For tax-neutral investors, whether they get dividends or capital gain does not matter. It is however assumed that businesses and individuals but also investment funds prefer capital gains rather than dividends because of the fact that tax liability can be paid later than it would have to be if they gained dividends. Partnerships clienteles are however those who are most reluctant to holding dividend paying stocks because when ordinary income taxes are high, deferring capital gains is valuable. (Dahlquist et al., 2012, p.4). Results show that the clienteles of tax neutral investors, investment funds and partnerships act the way they were expected to, but individuals and businesses are harder to generalize and does therefore depend on the sample that is used. (Dahlquist et al., 2012, p.24).

3.4 – Risk

There are many sources of risk in financial markets, but the common nominator of these is the high level of uncertainty. Just as there are many sources of risk, there are several ways to look at, and measure risk. These will be explained more in-depth below.

3.4.1 - Risk-Return

The risk-return is a common concept in finance. With risk-return, investors refer to how they demand a greater return for investing in a riskier security. With return, it is referred to the expected return. The expected return cannot be calculated from previous data. That is because the expected value is the weighted average of a possible return and the probability of the return is used as the weight. (Hull, 2012b, p.2). Ghysels et al. (2005) called the risk-return tradeoff the “first fundamental law of finance”. Studies of this relationship has although been criticized since a few studies have found the relationship between risk and return to be negative or not strong enough to draw a positive conclusion. (Ghysels et al., 2005, p.510). In their study, however, they found a positive relationship between risk and return using the MIDAS estimation. They also argued that their findings were more conclusive than those of other studies because of the method they used when estimating the results. (Ghysels et al., 2005, p.544).

Hui and Whitelaw (2006) are also bringing up the widely debated question of whether there is a risk-return relationship but also how much volatility are affecting stock prices. (Hui and Whitelaw, 2006, p.1433). Using the ICAPM estimation, they found a positive relationship between risk and return on the stock market. Furthermore, they

conclude that volatility explains only a small part of why the return is varying. (Hui and Whitelaw, 2006, p.1459-1460).

The "volatility risk premium" has become a well-known concept. Yoon and Buyn's (2012) explain that risk-averse investors are willing to pay a premium for hedging against volatility. Less risk-averse investors are however more willing to take on a risky investment without paying a premium. Furthermore, in their study they found that investors show different degrees of risk-aversion depending on which market they are trading in. They found that S&P investors were those who were most willing to pay risk compensating premiums in their sample. (Yoon and Byun 2012 p.59-60).

As volatility is a measure of risk, this means that when volatility increases, the return an investor expects will increase as well. The risk-return concept is of relevance for this research because it is of interest to know how an investor reacts when the risk in a security increases. If we find a relationship between cash dividend and stock return volatility, we can, using the risk-return concept, predict how an investor will react to the change in cash dividend and its subsequent effect on volatility (risk).

3.4.2 - Volatility

As volatility is one of the primary variables that we are looking at we will further introduce the reader to the concept, ways to calculate volatility and the asymmetry in volatility. Based on the assumption of rational investors, no firm or investor prefers a volatile stock if there is a safer choice with the same expected return. But as we already know, due to the risk-return tradeoff, the more volatile a stock is, the riskier is the investment and the higher the expected return. Percentage changes in rates of return or prices should be used to measure volatility according to academics and finance professionals. (Schwert 2011 p.790). The most common measure for volatility is however the standard deviation. A large standard deviation indicates a possibility of a large positive or negative return (Schwert 2011 p.792-793).

There is no evidence of what causes volatility. Some argue that it is the result of the trading itself while many also suggest that it is caused by new information entering the market. (Hull 2012a p.307). Schwert (1990) found evidence that shows that there is a relationship between stock return volatility and the amount of trading activity. One hypothesis is that new information could make investors revalue their investments, causing them to buy or sell. If many investors receive this information at the same time, volume of trading might therefore go up, making the stock more volatile. Another reason may be an increase or a fall in the value of a stock. If the value increases or decline, the investor may believe that this is the beginning of something persistent and hurries to buy or sell the security. Furthermore, a possibility is also that investors are rethinking their investments and reinvest in their previous securities as stock price changes. (Schwert 1990. p.30). It is although debated whether high volatility is the result of a high volume of trading or if high volatility and high trading volume both results from the entrance of new information (Schwert 1990 p.24).

As the time period of the sample will cover the financial crisis, it is interesting to see how volatility was affected by this. During the recent financial crisis, the stock return volatility was extremely high. (Schwert 2011 p.790). Schwert (2011) found that many countries experienced unusually high stock volatility and although it was high for almost all of the market, an outstandingly high volatility was found in the financial sector. Evidence show that shareholders did not believe that the volatility would be

that high for long since volatility levels went back to normal after only a couple of months. This probably happened because shareholders realized that volatility would not stay high for long. People have compared this crisis to the great depression, but according to Schwert, this comparison is exaggerated (Schwert 2011. p.804-805).

3.4.3 - Implied Volatility

While volatility is measuring the present, and historical volatility the past, implied volatility is a prediction of the future. Implied volatility is often mentioned in connection to options. It is often referred to as the unobservable variable in Black-Scholes formula for option pricing. The importance of option pricing in connection to implied volatility is most likely derived from the fact that Black-Scholes formula for option pricing can be used to solve for the implied volatility. This can be done since the implied volatility is the only variable missing in the formula. All other variables being observable, one can easily use these to calculate implied volatility. (Giot, 2005, p. 92). In option pricing, it can be referred to as *"the volatility that gives the market price of the option when it is substituted into the pricing model"* (Hull, 2012b, p.208). Because of the fact that historical volatility often also is used to calculate volatilities, we will give you a brief introduction to the concept.

3.4.4 - Historical Volatility

No one can predict what a security's life will look like, therefore the standard deviation of stock return can be calculated. This can be done by examining historical price data. (Dubofsky and Miller, 2003 p.532). Engle (2004 p.405) describes the estimation as, over a short period, looking at the sample standard deviation of returns. He also argues that the historical volatility is often used and has been for a long time. Moreover, he raises the problem of what timeframe that should be measured. If a too short period is examined, the result will include a lot of noise and if the period is too long, the result will not be of relevance for right now. The risk that is particularly relevant for risk managers is the future volatility, therefore, volatility has to be forecasted.

3.4.5 - Asymmetric Volatility

The concept of asymmetric volatility refers to when "*return volatility is higher in response to a price decrease than to its increase"* (Yamamoto, 2010, p.1208). Braun, et al. (1995 p.1599-1602) found that there is predictive asymmetry at the level of the market. That is, volatility reacts more to bad news than to good news. They found that volatility increases more to bad news of a certain weight than it decreases to good news of the same weight. They also concluded that predictive asymmetry is present in the volatility of all portfolios.

One of the common explanations for the occurrence of asymmetric volatility is the volatility feedback effect (Yamamoto, 2010, p.1209). The volatility feedback effect can be referred to as the effect that follows a volatility increase. As an increase in volatility is discovered, the required return on equity increases, which cause the stock price to fall. (Wu 2001 p.838). Yamamoto (2010, p.1209) is also describing it as, when the price is changing more than expected, agents increases the estimated variance. This leads to a higher level of uncertainty, which leads to a demand for a risk premium and a lower price. When the price is declining more than what was expected, the decline will be more intense than expected whereas if there is an increase, it will not be as intense.

As this section indicates, volatility is an extensive concept. For our research, we will look at the volatility over a period of 5 years (2007-2012). We will look at the companies that have changed their cash dividend from one year to another and how volatility has changed accordingly. If there is a trend to be found among these observations, we will be able to conclude that there is either a positive or negative relationship or no relationship at all. Therefore, we will not estimate implied but rather look at the historical volatility.

3.4.6 - Beta

Beta is one of the primary measures we will be using for this study. As mentioned in chapter 1, beta (β) is a tool that is used for measuring systematic, or in other words non-diversifiable, risk (Hull, 2012a, p.798). Beta measures a stock's sensitivity to movements in the index. When beta is 1.0 the return of the stock is exactly the same as the return of the market index, while a stock with a beta of 2.0 is twice as sensitive. A stock with a beta of 0.5 generates half the amount of return of the index and so on. (Hull 2012a p.62).There is extensive research about beta. Among others, Pettengill, et al. (1995, p.115) found that there is a relationship between beta and returns, but even more interestingly, they also found that the tradeoff between beta and average portfolio returns is positive. Due to these findings, they concluded that beta is a good measure for risk.

The further away beta is from 1.0, the greater is the volatility. It is also argued to some extent that the higher the volatility, the larger is the return (Trainor Jr, 2012, p.2). Trainor Jr (2012, p.9-10) found that low beta portfolios often perform better than high beta portfolios over long time horizons. Although in markets with low volatility, high beta portfolios are generating more return. He also found proof that a portfolio with a high beta in a volatile market is generating negative returns.

3.4.7 - Standard Deviation

Like beta, standard deviation is one primary measure we will use in our research. We will therefore explain the concept of standard deviation a bit further. Moore et al. describes the standard deviation as *"…measures spread by looking at how far the observations are from the mean"* (Moore et al., 2009, p.40). In finance, it is commonly thought that if the return spread of an investment is large, the returns are less predictable and therefore the investment becomes more risky than an investment with a small spread. (Moore, 2009, p.42). Hull (2012, p.4) argues that the ultimate scenario for investors would be to reduce the standard deviation of return while increasing the expected return.

3.5 - Previous Studies

As been mentioned previously, there are to our knowledge not one study that has been conducted in this way before. Most studies on dividend policy are in relation to some other variable and have mainly been conducted in the US market. The few studies we have found that are similar to ours are testing the effect of dividend policy on the volatility of the share price. The first study within this field seem to have been Baskin's (1989), which have set the ground work for the following studies on the same topic.

Baskin's study was on 2344 US firms between the period 1967 to 1986 and he studied the relationship between dividend yield and stock price volatility and additionally the

relationship between the dividend payout ratio and stock price volatility (Baskin, 1989, p. 22). He found a significant negative relationship between dividend yield and the stock price volatility. In other words, the higher the dividend yield the lower the stock price volatility. Therefore, he concluded management can affect, or control, the stock price risk by altering the firm's dividend policy. He went on and suggested that data from other countries should be empirically tested as well, to bring more evidence on this topic. (Baskin, 1989, p. 24).

Following Baskin's (1989) study came Allen and Rachim's (1996) study on the Australian market. They took a sample of 173 Australian listed firms and investigated them over the period 1972 to 1985. They conducted cross-sectional regression analysis on the relationship between stock price volatility and dividend policy. In contrast to Baskin (1989), they found no evidence of dividend yield being correlated with stock price volatility. Although, they found a significant negative relationship between dividend payout ratio and stock price volatility. (Allen and Rachim, 1996, p.175). Allen and Rachim conclude however, that "*...the major determinants of price volatility are basic earnings volatility and leverage*" (1996, p. 186.). Furthermore, they are questioning Baskin's suggestion that dividend policy per se would be affecting stock price volatility. Allen and Rachim rather argue that it is not clear which way the causality goes and that more research on the subject is necessary (1996, p.186).

A few other more recent studies studies have been conducted on the same topic. For example, Suleman et al. (2011) looked at the equity market in Pakistan. Hussainey et al. (2011) did a similar study to Baskin's, but with focus on the UK-market. Furthermore, Hashemijoo et al. (2012) investigated the impact of dividend policy on share price volatility in the Malaysian stock market.

The study by Suleman et al., covered non-financial firms listed on the Karachi Stock Exchange (Pakistan) and the period 2005 to 2009 (2011, p.45). Their results show a positive correlation between dividend yield and price volatility, which is in reverse direction from Baskin's (1989) results who found negative correlation between these two variables (Suleman et al., 2011, p.52). Hashemijoo et al., limited their study to consumer product companies listed on the main market of the Kuala Lumpur stock exchange (Malaysia) and their sample consisted of 84 companies from within this sector, analyzed during six year, between 2005 and 2010 (2012, p.111). Their results were in consistency with Baskin's (1989) findings, as they found significant negative relationship between both dividend yield and share price volatility and dividend payout ratio and share price volatility. Therefore, on the other hand, their findings were inconsistent with Allen and Rachim's (1996) who found dividend yield to not be associated with share price volatility. They concluded based on their findings that share price volatility can be reduced by managers acting to alter the firm's dividend policy, this is in line with Baskin's (1989) conclusion as well. (Hashemijoo et al., 2012, p.126-127).

When examining the UK market Hussainey et al. (2011) used multiple regression analysis to explore the relationship between share price volatility and dividend policy. They investigated a period of ten years, 1998 through 2007 and a sample of firms listed on the London Stock Exchange. Their findings included a significant positive relationship between dividend yield and share price volatility and a negative

relationship between dividend payout ratio and share price volatility. (Hussainey et al., 2011, p.57).

From these studies it is clear that there is no consistency over different markets and economical environments as to whether dividend policy affects share price volatility. The above presented studies show a mix of results and there seem to be no pattern of similar results in developed markets versus in emerging markets. As our research is focused on the Swedish market we looked for similar studies conducted on the Swedish market and even the Nordic market, however, no such studies of relevance were found. Although the above presented studies differ from our study, it is still the most similar studies we have found. They are included here as they can shed some light on our research and provide some basic understanding on what has been found so far within this topic.

3.6 - Summary of Theoretical Framework

In the section above, five theories regarding the irrelevance and relevance of dividends have been presented. In addition, several concepts of relevance for the thesis such as risk-return, volatility and beta were also introduced. A brief summary will be provided below of the most important features of the different theories and concepts in order to ease the understanding of them.

3.6.1 - Dividend Irrelevance Theory

The dividend irrelevance theory has become one of the paradigms of corporate finance and is presented in every discussion of dividend policy. The theory rests upon assumptions of a perfect capital market, where all participants behave rationally and where all participants have access to the same information. If these criteria are fulfilled a firm's dividend payout policy is irrelevant, as it will not affect the firm value, shareholders' wealth or the firm's cost of capital.

3.6.2 - Signaling Theory

Within this theory it is believed that all market participants do not have access to the same amount of information. Rather, management has inside information about the future outlook for profit opportunities that investors do not have. Therefore, the amount or change in dividends payment functions as a signal to market participants of the expectation of future cash flow. An increase in dividends payment signals that there are good opportunities for future earnings and vice versa.

3.6.3 - Agency Costs and Dividend Policy

Managers are agents, hired by the shareholders, to act in the interest of maximizing firm value. However, managers might sometimes have interest and underlying objectives that differs from those of the shareholders. Agency costs therefore arise due to the need of shareholders to monitor the management and also arise due to the risk aversion preference of managers. With excess cash flow, agency costs tend to increase. Dividends could therefore be increased as a means to lower the agency costs.

3.6.4 - Bird-in-the-Hand Hypothesis

This hypothesis states that receiving dividends now rather than capital gains in the future is preferred by investors, because it provides certainty. This is because there is a higher degree of uncertainty connected to future capital gains than to dividends. This hypothesis therefore directly counteracts the dividend irrelevance theory, as that theory

says that investors are indifferent to dividends or capital gains because they can either way create their own home-made dividends.

3.6.5 - Clientele Effect

The clientele effect theory assumes that different investors are attracted to different dividend policies. Consequently, investors can be grouped into different clienteles based on their dividend preferences. Therefore, companies can attract different clienteles by changing their dividend policies.

3.6.6 – Risk Measures

The risk-return tradeoff was also presented in the theoretical framework. This tradeoff refers to the fact that the riskier a security is the higher its expected return must be. Therefore, if a high expected return on a security is sought, then the investor must be prepared to take on more risk. Volatility is a measure of risk. Specifically, volatility measures the variations around the mean stock price. A security with high swings in its price is therefore more volatile than a security with a stable stock price. Due to the risk-return tradeoff, a rational investor would choose the security with the lowest volatility, if the expected return were the same for all possible investments. The last two concepts that were presented were beta and standard deviation. Beta measures the covariance between the rate of return for the specific stock and the market index. Beta can be seen as the systematic risk of a stock, as beta measures the correlated volatility of the stock's return in relation to the market. For example, a beta of 1 would imply that the stock moves exactly with the market index.

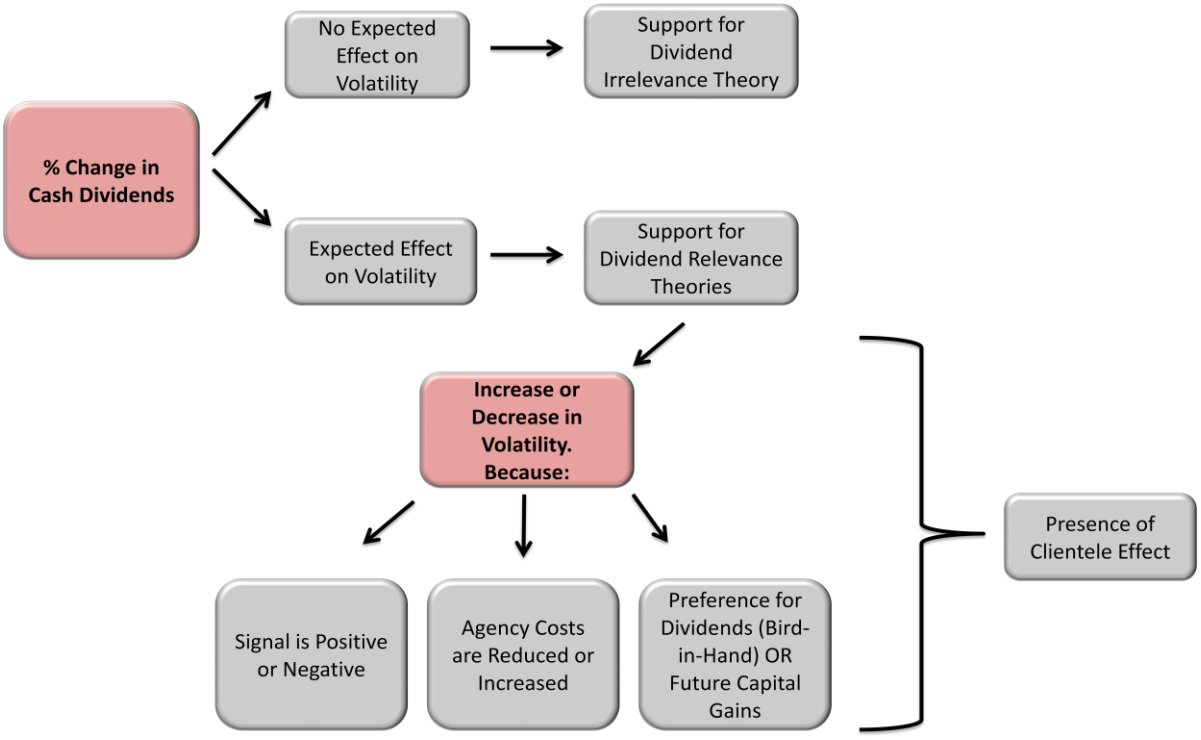

Figure 5 - Theoretical framework and the research question

Source: By the Authors

In the figure above the application of the described theories for the research is graphically presented. If there is a change in cash dividends distributed and the statistical analysis shows no effect on return volatility it would be evidence in favor of

Miller and Modigliani's dividend irrelevance theory. In contrast, if an effect is found the conclusion of support for the relevance of dividends can be inferred. There might be several reasons why an increase or decrease in volatility would occur. We can discuss if the effect is caused because of agency costs and their relation with dividends, because of the signaling hypothesis or because of the bird-in-the-hand hypothesis, or if a combination of them all affect return volatility.

When there is a change in dividends it can send a signal. For example, if there is an increase in the amount of dividends paid it sends a positive signal, and therefore we would see a decrease in return volatility as shareholders feel more confident of the future stock performance. Furthermore, an increase in dividends could also reduce agency costs as it would decrease excess cash flow, and therefore, as agency costs decrease investors feel more confident and the return volatility consequently decreases. As for the bird-in-the-hand hypothesis, an increase in dividends would lead to a decreased return volatility as investors according to this hypothesis prefer to receive dividends over future capital gains which bring an uncertainty, therefore, return volatility would decrease because of the certainty of dividends.

The clientele effect occurs when clienteles, investors with similar dividend preferences, move from one stock to another because of their specific preference. Every firm is likely to attract different clienteles with its dividend policy. Therefore, an announced dividend change in either way, can both attract or scare away current and potential shareholders, and consequently, affect return volatility either positively or negatively.

These theories are the most relevant theories in order to answer the research question at hand. They are also essential in the way that they guide and provide us with the theoretical groundwork necessary to build the hypotheses that will enable us to generate new empirical findings. Therefore the hypotheses could be said to be an extension of the above presented theories and they will be presented at the end of chapter 4.

Chapter 4 – Practical Method

This chapter aims to make the reader familiar with the practical methodology of the research. Firstly, the sample data and time horizon will be presented, followed by a description of the data collection and data frequency. Thereafter, the estimation of variables will be explained as well as the statistical analysis that will be utilized. The chapter ends with a presentation of the hypotheses for the statistical tests.

4.1 – Sample Data

The population includes all companies listed on NASDAQ OMX Stockholm that have distributed cash dividend on at least one occasion between the years 2007-2012. There are however a few more companies that have been excluded from the population, in order to diminish the risk of misleading results. These are:

- Companies' B shares if they have both "A" and "B" shares
- Companies that have not been listed since 2006
- Companies that have been unlisted before 2012
- Companies for which there is no data to be found

The tables below show the excluded as well as the remaining number of companies. It provides an overview of the number of companies that have been excluded due to the above standing reasons.

	Original Population	**Final Sample**
Large Caps	89	55
Mid Caps	69	43
Small Caps	125	64
Total	**283**	**162**

Figure 6 - Sample

Source: By the Authors

The table shows that we have excluded many small cap companies from the original population. This is not surprising since it is commonly known that small firms use their earning for reinvestments rather than to distribute it as dividend, in order to grow faster. In the large cap and mid cap segments however, most firms are paying out dividend as they often are more mature.

After excluding all companies that did not fit our research, we were left with a number of 162 companies. This number of companies will provide us with enough observations to be able to conclude if there is a relationship between the variables we are testing. The following section will briefly explain the importance of a large enough sample.

4.1.1 - Sample Size

Saunders et al. (2009, p.450) explains that using a small sample makes the statistical tests rather insensitive. That is, if the sample is small, the statistical test will show weak evidence of a relationship that is statistically significant. Therefore, if the relationship is expected to be very weak, a large sample size is preferable in order to reach statistically significant evidence.

The population we are examining is rather large since we are examining the majority of the companies listed on NASDAQ OMX Stockholm. After excluding these companies, the sample is still rather extensive. That means that if there is a relationship between changes in cash dividend and return volatility in reality, albeit a weak one, the probability of reaching a statistically significant result of the relationship is greater. With this in mind, we decided to look at all companies for which there are data to be collected during this time period.

4.1.2 – Time Period

As we will examine the years 2007-2012, the sample period includes the financial crisis that occurred in 2008. We are expecting a slightly higher volatility in 2008 when the financial crisis took place. As mentioned before, Schwert (2011, p.790) argued in one of his articles that the return volatility was extremely high during the financial crisis 2008. Schwert (2009, p.804-805) further argued that it although did not stay high for long, since people quite quickly realized that the high volatility would not be consistent.

Figure 7 - NASDAQ OMX Stockholm Benchmark PI

Source: NASDAQ OMX Nordic (2013)

The graph shows the NASDAQ OMX Stockholm Benchmark Price Index from January 1st 2007 through December 31st 2012. As we can see from the graph, there is a large reduction in the price index in the end of 2008 through mid 2009. This is evidence of the financial crisis. In the graph, we can also see that there has been a economic downturn in 2011 as well, which might have an effect on return volatility.

Taking the financial crisis and large economic downturns into consideration is crucial for our results and conclusion. Since there is evidence of a higher volatility due to the financial crisis, this has to be considered when looking at the results of our empirical study.

4.2 - Data Collection

In order to collect the data we need Thomson Reuters Datastream will be used. Since Thomson Reuters Datastream is a very reliable source that is widely used, we are confident using the data provided by this database. A few of the variables we need in order to conduct the empirical research are however not available in Datastream. That was the case with the volatility measures: beta and standard deviation. These are therefore calculated using data that is to be found on Thomson Reuters Datastream. Adjusted share price is to be found in Thomson Reuters Datastream and is therefore used for calculating standard deviation and beta. Moreover, the price index for OMXSBPI as well as the dividend per share (DPS) was gathered from Thomson

Reuters Datastream.

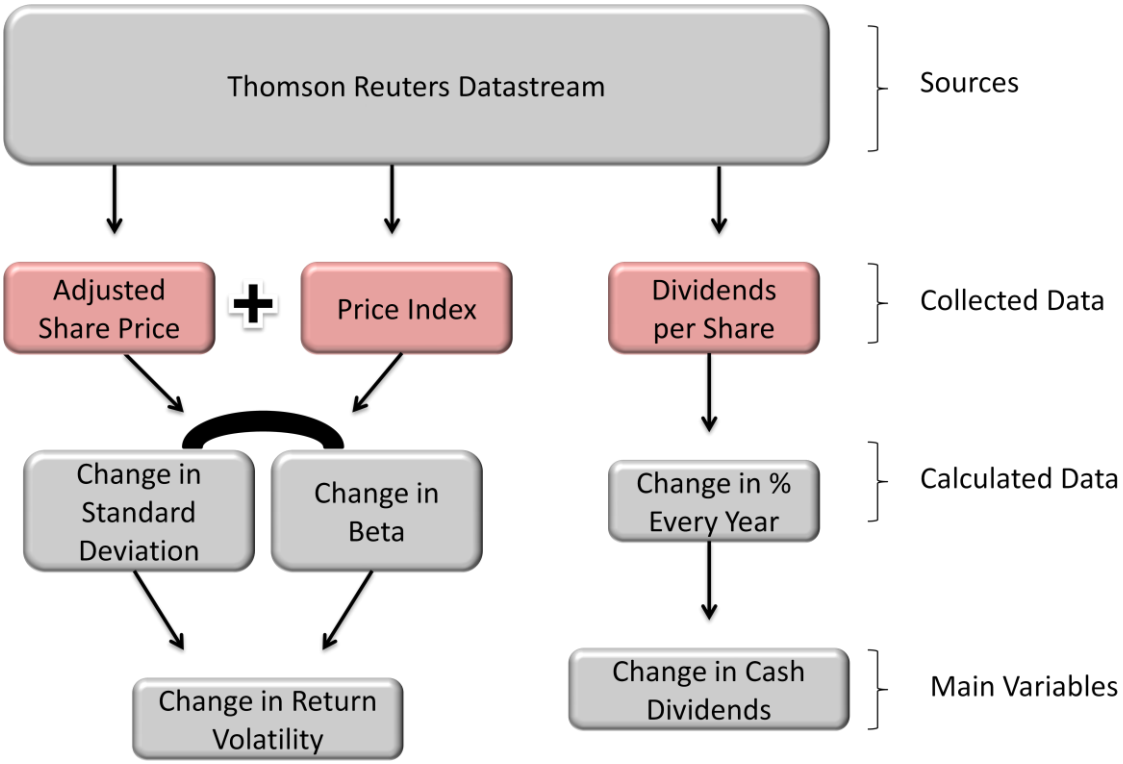

Figure 8 - Data Collection Procedures

Source: By the Authors

The above model describes which data we will collect through Thomson Reuters DataStream and what they will be used for. Adjusted share price and NASDAQ OMX Stockholm's Benchmark Price Index (OMXSBPI) will be used for the calculation of the volatility measures beta and standard deviation, as mentioned previously. DPS, which can be found on Thomson Reuters Datastream will be used to look at the change in DPS from year to year.

4.3 - Data Frequency

As dividend is paid out once every year in Sweden, we are looking at changes on a yearly basis. DPS is collected for every year between 2006 and 2011, this is because the dividend per share in 2006 is the dividend distributed in 2007. For example, the announced DPS in 2006 is intended to represent the anticipated dividend payment in 2007. Therefore, we collect DPS one year in advance of the adjusted share prices, so that they will correspond to each other.

For the volatility estimations, data is collected from 2007 until 2012. Furthermore, for the volatility estimations, daily share prices will be used for estimating beta and standard deviation. That is because daily share prices generates a more accurate beta and standard deviation, and is therefore better to use than yearly share prices.

The fiscal year for the majority of the firms on the Swedish market is running from January 1st through December 31st. Therefore, we will gather data starting from January 1st until December 31st each year from 2007 until 2012. The cash dividend

amount is however based on the net income that is earned in the fiscal year, and not paid out until later the following year. Most companies pay out their dividends in May the latest.

4.4 – Estimations of Variables

4.4.1 - Log Returns

We have collected daily stock prices of the individual stocks listed on OMX Stockholm. However, rather than looking at stock prices we are interested in examining the returns, as receiving the highest possible return while taking on the smallest possible risk is the main goal of investors. Specifically we will calculate the log returns, also recognized as continuously compounded returns. The stock returns will be calculated by the following formula as presented by Ruppert:

$$r_t = \ln(1 + R_t) = \ln(P_t) - \ln(P_{t-1}) = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (4.1)$$

Where r_t is the log return, P_t is the price at time $_t$ and P_{t-1} is the price one period before time $_t$. r_t is therefore a natural logarithm of the ratio between the stock price at time $_t$ and the stock price at $_{t-1}$. (Ruppert, 2004, p. 76).

Log returns are the most popular type of returns to look at when analyzing financial data as they facilitate statistical inference. This is because of the fact that one of the main advantages of using log returns is that they are time-consistent. Ruppert explains that this means that log returns offer simplicity for multiperiod returns. To get a *k* period log return one could simply sum all single periods log returns whereas using ordinary returns one would have to use multiplications of all observations, which would be extremely time-consuming with many observations. (Ruppert, 2004, p.77). Moreover, by the utilization of log returns rather than ordinary return we gain more statistical freedom as the log returns are generally normally distributed. This is because of the assumption of prices generally being i.i.d (mutually independent, identically distributed, normally distributed) and log-normally distributed. Consequently, log returns will be i.i.d which will also imply that, not only single-period, but also multiple-period log returns are normally distributed. (Ruppert, 2004, p. 80). As this is a basic requirement for many statistical tests we have more possibilities by using the log returns.

The stock prices used to calculate the log returns are adjusted stock prices gathered from Thomson Reuters Datastream. The adjusted stock prices are the official closing prices already adjusted for subsequent capital actions. As such the effect of dividends is already accounted for and excluded from the stock prices. Therefore, the adjusted stock prices are preferable to use in this study as we want to exclude the effect of dividends when calculating the volatility measures, beta and standard deviation which are based upon the returns. This in order to be able to identify the effect changes in dividends have on these measures.

4.4.2 - Dividend Change

To illustrate the change in dividends from year to year we have used the dividend per share (DPS). Specifically, the following formula will be conducted in order to reach a

change in dividends expressed in percentage:

$$\Delta\, Dividend \;=\; \frac{DPS_t - DPS_{t-1}}{DPS_{t-1}} \qquad (4.2)$$

Where the change in dividend is expressed as a percentage, stemming from the ratio between the change in DPS in time $_t$ and $_{t-1}$, and the dividend per share in time $_{t-1}$. The DPS is collected from Thomson Reuters Datastream as yearly data, from 2006-2011. From Datastream, the dividend per share is explained to represent the 12 month anticipated payments based upon indications and forecasts, and excluding special dividends, divided by the amount of outstanding shares of the period. Moreover, it is the gross dividend, which means that no tax has yet been deducted. The DPS is therefore a good proxy for dividend payments and by representing the changes in cash dividends as percentages it allows us to make comparison between companies and capitalization size.

4.4.3 - Return Volatility

Both beta and standard deviation will be used as proxies for return volatility. After calculating the log returns we will go on to calculate both beta and standard deviation of returns for each stock in the sample. The formula used to calculate beta is retrieved from Bodie et al., (2009, p. 281):

$$\beta \;=\; \frac{Cov_{(ri,\ rm)}}{Var_{(rm)}} \qquad (4.3)$$

Where $Cov_{(ri,\ rm)}$ is the covariance of the specific individual stock's return $_{(ri)}$ and the market index return $_{(rm)}$ and $Var_{(rm)}$ is the variance of the market index return. Therefore, as mentioned earlier, the beta measures how much, and in which direction, the individual company stock moves when the market index moves. Beta is therefore the measure of sensitivity of a stock's compared to its benchmark, which in this study is the OMXSBPI.

The second measure for return volatility that will be utilized is standard deviation. Moore et al., (2009, p. 40) explain standard deviation as the spread of the observations from the mean. Therefore we will use the log returns of each company's stock to calculate the standard deviation. Standard deviation is the most common measure for volatility of investments. The further away the observations (returns) lie from the mean (average return) the higher the standard deviation the greater the return volatility is. The formula for standard deviation is the following:

$$s \;=\; \sqrt{\left(\frac{1}{n_{-1}}\right)\sum(x_i - \bar{x})^2} \qquad (4.4)$$

As such the standard deviation is the square root of the variance of the observations. It must be noted however, that the standard deviation just as the mean, can be greatly affected by outliers. The more outliers there are the higher standard deviation will be. (Moore et al., 2009, p. 40-41). Consequently, the data in this study will be tested for normal distribution in order to discover potential skewness that would greatly affect

the results.

The beta and standard deviation values will then be calculated into changes from year to year in percentages. The formula to calculate the change will be the same as the one used to calculate the dividend change. By examining changes in both beta and standard deviation of returns we expect to acquire more empirical findings that can bring nuances to the results and in turn contribute to a greater understanding on the relationship between return volatility and cash dividend alterations.

4.4.4 - Market Index Return

As mentioned, the market return is an important part of the calculation of beta. We have chosen the OMX Stockholm Benchmark PI (OMXSBPI) as a proxy of the market index. Since OMXSBPI represent all stocks traded on NASDAQ OMX Stockholm it gives an overall picture of the development on the market.

4.5 – Statistical Analysis

4.5.1 - Exploratory Data Analysis

Before conducting any statistical inference the data need to be examined with descriptive analysis to describe the data's main features. All data variables must be tested for normal distribution as this is often a requirement for statistical inference. Normal distribution of quantitative data means that if the quantitative data is plotted in a graph, often a histogram, and a density curve is drawn, this curve would then be symmetric, single-peaked as well as bell-shaped. (Moore et al., 2009, p.55). Normal distributions are described with mean and standard deviation, as N(u, o). Normal distributions all follow the same rule, which is that 68% of all observations are within one standard deviation of the mean, 95% within two standard deviations from the mean and 99.7% of the observations lie within three standard deviations from the mean.(Moore et al., 2009, p. 57-57).

The distribution of the variables of change in dividends, change in beta and change in standard deviation will each be tested separately for normality. The normality tests that will be conducted in SPSS are the Kolmogorov-Smirnov and Shapiro-Wilk. The variables will first be tested covering all changes for the whole time period as well as for each year separately. Secondly, we will examine if the distributions differ depending upon market capitalization. Therefore, the variables will also be examined for normality in the different sub-samples.

Moreover, descriptive statistics specifically in the form of graphs will be conducted as well. This in order to depict variables in an understandable way and expose certain attributes of them.

4.5.2 - Correlation

Our research question aims to answer whether there is a relationship between changes in dividends and changes in return volatility. To do so, Pearson's Correlation and Spearman’s rho tests will be applied as a means to identify the strength of a linear relationship between our variables, change in beta and the cash dividend change as well as the linear relationship between change in standard deviation and the cash dividend change. We will utilize SPSS for the correlation analysis. The formula for the calculation of the correlation coefficient is as follows (Moore et al., 2009, p. 111):

$$r_{xy} = \left(\frac{1}{1_{n-1}}\right) \sum \left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right) \quad (4.5)$$

Where r is the sample correlation coefficient, x and y are the measured variables $\bar{x}$ and $\bar{y}$ are the mean of the variables, s_x and s_y are the standard deviations of each variable and n is the number of observations.

Saunders et al., explains that the correlation coefficient will take a value between -1 and 1. A value of 1 indicates a perfect positive relationship, whereas a value of -1 indicates a negative relationship. This would mean that as there is an increase (decrease) in one of the variables there would be an increase (decrease) in the other variable as well because these variables are perfectly related. A correlation coefficient of 0 indicates no relationship. The closer the value is to either -1 or 1 the stronger is the relationship. (Saunders et al., 2012, p.521).

Moreover Saunders et al., mention that the correlation coefficient must be tested for statistical significance in order to exclude the possibility of the correlation coefficient having occurred by chance alone. The probability of the correlation coefficient occurring only by chance should be less than 0.05 in order to be statistically significant. (Saunders et al., 2012, p.521).

The main drawback with the correlation test is that it does not identify a causal relationship, rather, it only identifies the strength of a particular linear relationship of two variables. Even though a strong relationship might be found we cannot conclude that one of the variables causes the effect on the other variable. Therefore, we will also conduct tests in order to identify what variables might explain changes in the dependent variable.

4.5.3 - Logistic Regression

By studying the changes in dividends, changes in beta and changes in standard deviation in percentage our variables might become un-robust. This is because of the fact that often times for example beta takes a value that is rather close to 0, by dividing a value with one that is close to 0 we would get rather high values of our variables which results in outliers and non-normal data. Therefore, if the distribution of the variables is non-normal and/or if we find no correlations among the variables then finding a relationship between an independent and a dependent variable in a simple linear regression is not probable.

Consequently, to deepen the findings and contribute with more knowledge we will then strengthen the statistical analysis and continue with logistic regression. The simple linear regression implies the testing of quantitative variables whereas a logistic regression test the relationship between a dependent *categorical* variable and where the independent (explanatory) variable(s) can be either categorical or quantitative (Moore et al., 2009, ch17, p. 17-1). By coding the quantitative variables into categorical variables they become significantly more robust. The main drawback however is that by doing this we exclude all scale information. For example, it will not be possible to discover how much of a change is needed to find a relationship between the variables. However, we argue that this can be justified by the research purpose, as our research tries to identify if changes in dividends have a relationship with changes in return volatility. The purpose is not to explain the nature of the relationship in

depth and the reasons why it exists or does not exist. That is rather up to future research to identify.

We will create dummy variables for the logistic regression and all variables will be coded into categorical variables:

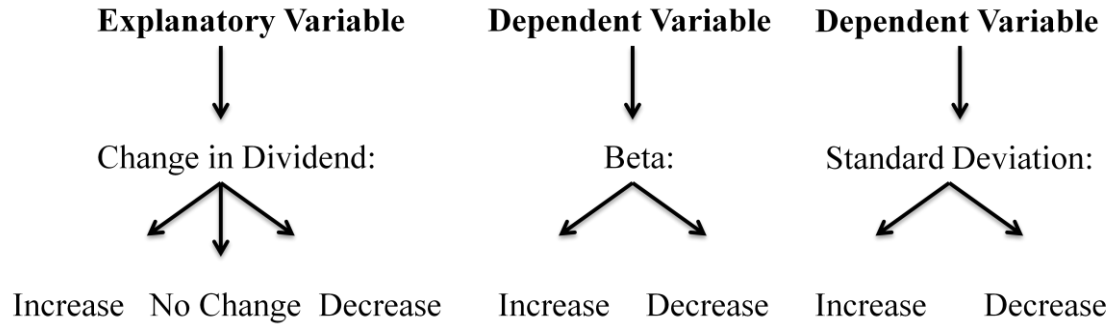

Figure 9 - Variable Coding

Source: By the Authors

The logistic regression is described in a statistical model as (Moore et al., 2009, p. 17-4):

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_{1x} \quad (4.6)$$

where x is the explanatory variable and p is a binomial proportion. β_0 and β_1 are the parameters of the model (Moore et al., 2009, p. 17-4). β_0 is the intercept and β1 is the slope of the model which is derived from the difference between the log(odds) of an increase and log(odds) of a decrease. In this case, p relates to the probability of having an increase where 1-p is the probability of a decrease in the dependent variable.

Moore et al., goes on to explain that when there is only one independent variable in logistic regression the statistical inference is similar to the inference for simple linear regression. Estimates parameters are calculated with standard errors, where the basis for hypothesis testing is the ratio of the estimate of the parameter to the standard error. Usually the p-values stems from the chi-square distribution having 1 degree of freedom. (Moore et al., 2009, p. 17-8.).

To form a hypothesis that resembles the hypothesis that one would construct in a simple linear regression to test "no linear relationship" the parameter β_1 which represent the slope of the model should be used (Moore et al., 2009, p. 17-9). When the p-value is less than the pre-set significance level the null hypothesis of $\beta_1=0$ can be rejected which would indicate that indeed, the explanatory variable does help in predicting the dependent variable.

However, for this specific research the logistic regression analysis will contain, beyond the change in dividend as explanatory variable, the size segments and the different years as explanatory variables as well. The size of the companies and the year dependence will be examined and included in the model in order to see if our results could possibly depend on these variables.

Firstly, due to the fact that our sub-question concerns whether the results will be different between the different sizes (large, mid and small caps) we will use size as our control variable. That is, how a change in cash dividends affects beta and standard deviation, depending on the size of the companies examined. We will therefore be able to see whether the size of a company is related to changes in return volatility.

Secondly, we test the effect of each year in the time period in order to see if the relationship between changes in dividend and changes in return volatility is different from year to year. Hence, we are using the different years as a control variable. If the relationship between changes in dividend and changes in return volatility varies widely from year to year, we will be able to conclude that the relationship depends on the year as well. As such we will have to run a multiple logistic regression where the fitted model will be:

$$\log(\text{odds})\ \text{increase/decrease beta} = \beta_0 + \beta_{1\text{increasedividend}} + \beta_{2\text{decreasedividend}} + \beta_{3\text{year2008}} + \beta_{4\text{year2009}} + \beta_{5\text{year2010}} + \beta_{6\text{year2011}} + \beta_{7\text{LargeCap}} + \beta_{8\text{MidCap}} \quad (4.7)$$

Where the dependent variable change in beta will be exchanged for standard deviation as well. In this model, the year of 2012 is used as reference for the explanatory variables of year, whereas small cap is used as reference for the explanatory variables of size. No change works as a reference for the explanatory variable of change in dividend.

The multiple logistic regression analysis will be done in SPSS. When we have run the analysis the coefficients of each variable will be examined. Each p-value for each coefficient test the hypothesis that the coefficient = 0 in a model that contains the other coefficients (Moore et al., 2009, p. 17-15). For example, if we were to find a p-value of 0.120 for the coefficient for the variable of large cap, we cannot reject the null hypothesis. In other words, we cannot conclude that being a company in the large cap segment adds any predictive ability, compared to a small cap company, on the independent variable when the other variables are included in the model as well.

4.5.4 - P-Value

For all statistical tests the significance of the finding will be tested by the p-value. The p-value basically measures the amount of statistical evidence in support of the alternative hypothesis. Ruppert (2004, p. 175) explains that the p-value for a regression analysis tests the coefficient for the null hypothesis as being 0 against the alternative hypothesis where it is not 0. When the p-value is lower than the predetermined significance level, which is usually 0.05 or 0.01, it indicates that the observed results are improbable under the null hypothesis. In other words, it indicates that, assuming the null hypothesis is true, the coefficient has not occurred by chance alone. In that case the null hypothesis is rejected in favor of the alternative hypothesis.

4.7 - Scrutiny of Practical Method

The data collected for this research stems from official sources. As such, it is important to scrutinize and be critical towards the credibility of the information provided. The majority of the numerical data has, as mentioned, been collected from Thomson Reuters DataStream. This database is heavily utilized by investors and

professional analysts, which should indicate that the information provided by the database is trustworthy and of good quality.

As this is a quantitative study and because of the nature of our research question a large amount of data needed to be collected. Consequently, the possibility of making a mistake in the manual processing of the numerical data is quite large, which may lead to false results. However, as we are aware of this possibility of human error we have taken measures to assure the accuracy of the manually processed data. Control computation has been made on a regular basis. Additionally, random spot-checks have been made on the stock specific data variables to assure that the calculations of these are correct. Moreover, the collected numerical data has been processed in Microsoft Excel which we deem to be reliable in handling these amounts of quantitative data and furthermore also reliable in the execution of mathematical processing.

By the awareness of the limitations and possible problems of secondary sources and the manual handling of numerical data we hope to decrease the influence of these risks.

4.8 - Hypotheses

In this section we will present the hypotheses that will be tested in order to answer this study's research question. The hypotheses have been built to fit the statistical models and as such are based on the coefficients in these models. Hypotheses 1 to 17 are related to the correlation tests, where hypotheses 3-8 contribute to the cross-sectional elements of this study, as they aim to compare whether there are differences between the sub-samples. Hypotheses 9 to 17 aim to identify whether there are correlation differences between the different years in the time period. Hypotheses 18 and 19 are related to the logistic regression analysis where we test the effect of different explanatory variables on changes in return volatility.

The most common levels of significance are 10 %, 5% and 1% for users of statistics. However, especially common is the use of the 5% significance level. (Moore et al., 2009, p. 399). The significance level chosen for this study will follow common standards and is therefore set at 5%. However, care must also be taken toward the fact that there is no exact point at which a test becomes significant or insignificant, a p-value of 0.0049 and one of 0.0051 have no real practical difference. As such, the p-value should also be considered in the light of being as low as possible as this indicates stronger evidence. (Moore et al., 2009, p.399).

The significance level does however provide some guidance. Therefore, when the p-value is less than 0.05 the null hypothesis will be rejected in favor of the alternative hypothesis. Hypotheses 1 to 17 test the coefficient r, where the null hypothesis is $r = 0$. The null hypothesis will be rejected if r deviates from 0 and the coefficient is significant ($p<0.05$). Hypotheses 18 and 19 are related to whether the explanatory variables in the logistic regression model can explain changes in return volatility. The null hypotheses are therefore based on the regression parameters. For example, the null hypothesis for each coefficient will be $\beta_n x_n = 0$. This means that if the null hypothesis is accepted, the variable cannot be concluded to explain any changes in the dependent variable when keeping the other explanatory variables in the model constant.

When the p-value for the coefficient is less than 0.05 it means that there is evidence that the explanatory variable affects the dependent variable. In that case the null hypothesis can therefore be rejected in support of the alternative hypothesis.

$$\text{P-Value} \leq 0.05 \rightarrow \text{Reject } H_0$$

Hypothesis 1

H_0: There is no correlation between changes in cash dividend and changes in beta during 2008-2012
H_a: There is correlation between changes in cash dividend and changes in beta during 2008-2012

Hypothesis 2

H_0: There is no correlation between changes in cash dividend and changes in standard deviation of return during 2008-2012
H_a: There is correlation between changes in cash dividend and changes in standard deviation of return during 2008-2012

Hypothesis 3-5

H_0: Correlation between changes in cash dividend and changes in beta does not exist in the size segment X (small, medium or large)
H_a: Correlation between changes in cash dividend and changes in beta does exist in the size segment X (small, medium or large)

Hypothesis 6-8

H_0: Correlation between changes in cash dividend and changes in standard deviation does not exist in the size segment X (small, medium or large)
H_a: Correlation between changes in cash dividend and changes in standard deviation does exist in the size segment X (small, medium or large)

Hypothesis 9-13

H_0: Correlation between changes in cash dividend and changes in beta does not exist in year X (2008, 2009, 2010, 2011, 2012)
H_a: Correlation between changes in cash dividend and changes in beta does exist in the year X (2008, 2009, 2010, 2011, 2012)

Hypothesis 13-17

H_0: Correlation between changes in cash dividend and changes in standard deviation does not exist in year X (2008, 2009, 2010, 2011, 2012)
H_a: Correlation between changes in cash dividend and changes in standard deviation does exist in the year X (2008, 2009, 2010, 2011, 2012)

Hypothesis 18

H_0: Changes in dividend does not explain changes in beta
H_a: Changes in dividend does explain changes in beta

Hypothesis 19

H_0: Changes in dividend does not explain changes in standard deviation
H_a: Changes in dividend does explain changes in standard deviation

Chapter 5 – Empirical Findings

This chapter presents the reader with the empirical findings of the research. First, we present the descriptive statistics for the coded variables that will be used in the logistic regression analysis, then the results from the normality tests. This will be followed by the results from the correlation testing between our variables. The findings from the logistic regression analysis will be presented at the end of the chapter. The chapter ends with a summary of the hypothesis testing.

5.1 - Descriptive Statistics

The descriptive statistics will help get an overview of the results we found in the statistical tests. Graphs will here be utilized in order to explain the changes in the variables coded into categorical variables for the logistic regression analysis.

5.1.1 – Changes for the Whole Time Period

From this table we can clearly see how the dividend has changed throughout the years.

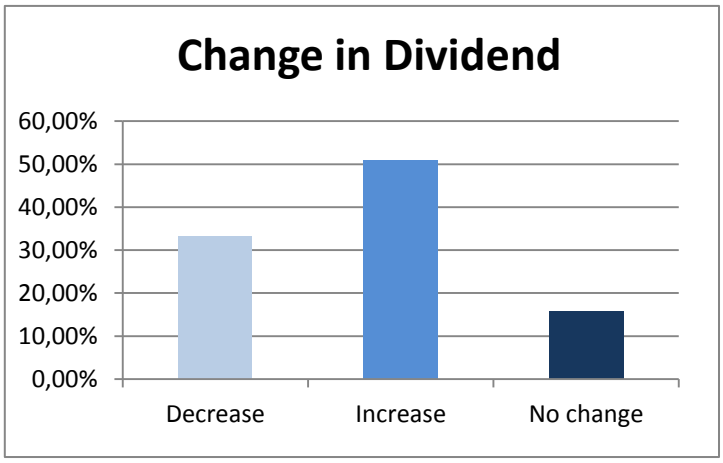

Figure 10 - Change in Dividend

Studying these changes we see that the dividend most often has increased from one year to another. Increases stands for 51% of the changes that occurred in dividend from one year to another between the years 2007 and 2012. Further, we can see from the graph that the decreases in dividend over the years stand for 33,2% of the changes whereas the remaining 15,8% indicates the amount of occurrences where the companies have not changed their dividend payout.

This graph below shows how many percent of the changes in beta that are increases and how many are decreases throughout the whole time period.

We can see from the graph that the beta values have more often decreased from one year to another than it has increased. The graph shows that 55,2% of the changes in beta between the years 2007 and 2012 are represented by decreases. That indicates that 44,8% of the changes are represented by increases in beta.

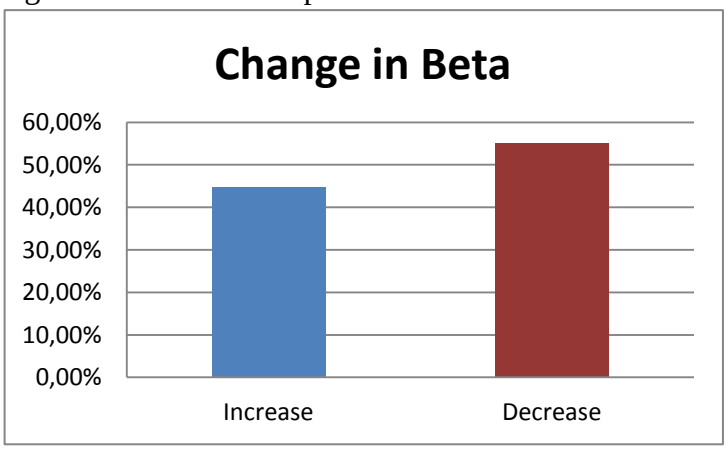

Figure 11 - Change in Beta

Similarly as for beta, we have created a graph that shows how many percent of the changes in standard deviation that were increases and decreases throughout the time period. The graph below will give us an overview of the changes in standard deviation.

As we can see from the graph, the changes in standard deviation are quite similar to the changes in beta. The decreases stands for 54,6% of all the changes from year to year, whereas 45,6% of all changes in standard deviation are increases. We can thus see that there are only a few percent that differs between how beta and standard deviation have changed throughout the sample period.

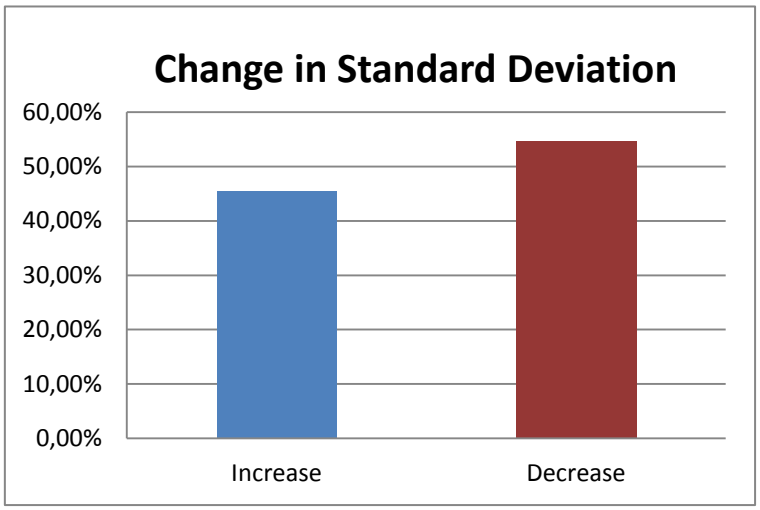

Figure 12 - Change in Standard Deviation

5.1.2 – Changes in Size Segments

Since our sub-research question concerns whether there is a difference in the relationship between changes in cash dividend and changes in return volatility depending on which size the company is, we are examining the different size segments more in-depth. The table below will show how the dividend has changed for the different sizes throughout the years in our time period.

As we can see from the graph, the increases make up for a large part of the changes in dividend. Specifically the large cap segment is reporting increases in dividend from year to year. The large cap segment is also the segment that has included the least occasions were no changes occurred throughout the time period, followed by the mid cap segment. In the mid cap segment, companies have decreased their dividend payments least often throughout the period, whereas companies in the small cap segment are the ones that have made the most decreases.

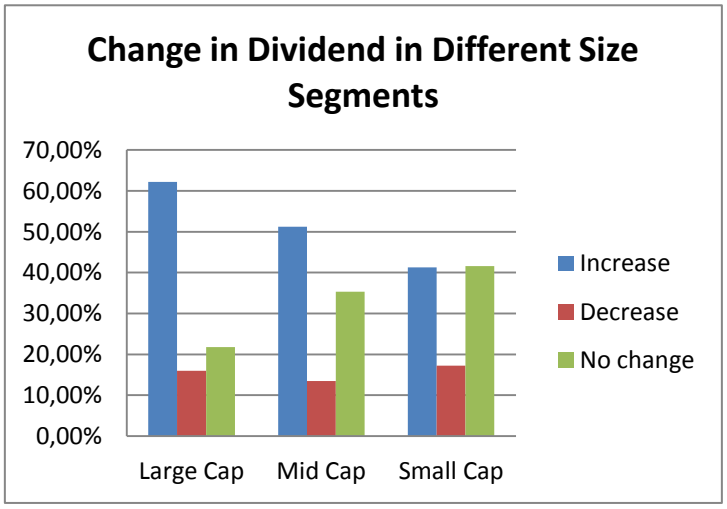

Figure 13 - Change in Dividend in Size Segments

Studying the changes in beta for the different size segments, we can conclude that the large cap segment is where beta has increased most often from year to year. It is also the segment where the least decreases in beta has occurred. Surprisingly, we can see that the small cap segment is the segment where the most decreases has occurred. Furthermore, the least number of increases can be found in the small cap segment.

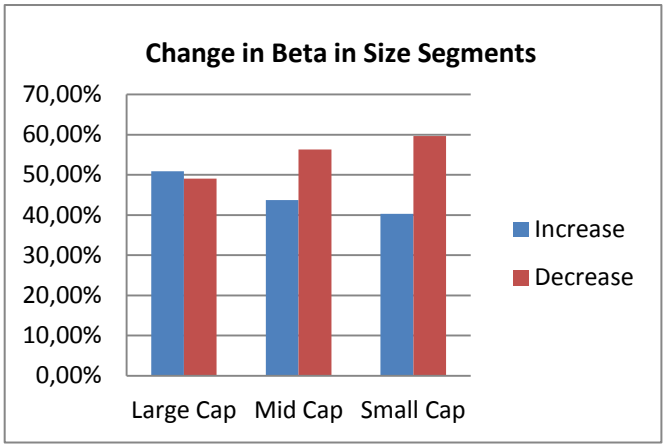

Figure 14 - Change in Beta in Size Segments

The standard deviation shows quite a different allocation of the changes than for beta. The small cap segment displays the least amount of decreases in standard deviation which is 52,2% and the highest amount of increases, an amount of 47,8%. Looking at the large cap segment, we can see that the increases are slightly fewer for the standard deviation than beta. Only 45,5% of the changes in the large cap segment were increases in the standard deviation, while 54,5% of the changes were decreases. In the mid cap size segment, decreases stood for 58,1% of the changes while 41,9% of the changes were increases. We can clearly see from this table that in all size segments, decreases in standard deviation were the most common change throughout the years.

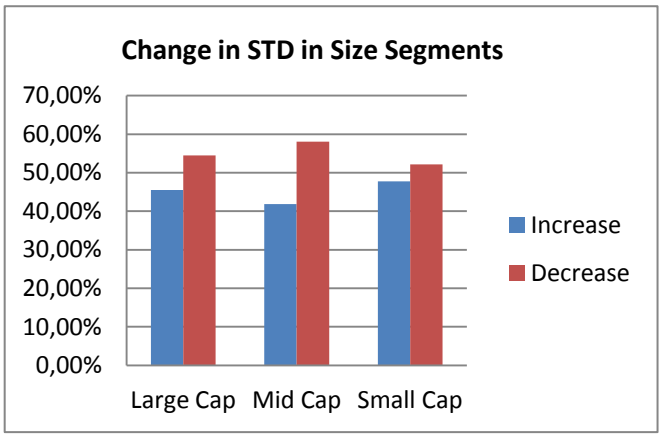

Figure 15 - Change in STD in Size Segments

5.1.3 – Changes in Each Year

We aim to see if there is a difference in how the variables have changed in the different years we are examining. We will use a set of graphs to see if there are any differences.

Studying the graph of changes in dividend throughout the years we find a notable difference in how the dividend payments have changed. Starting off by looking at 2008, we see that only a few (4,3%) decreases in dividends have been made from 2007 to 2008. Over 60% of the changes are increases in dividend whereas 30,2% of

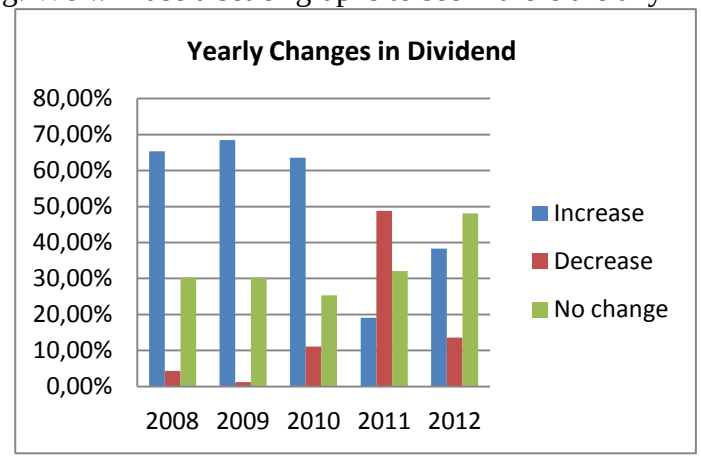

Figure 16 - Yearly Changes in Dividend

the companies have kept the same dividend as the previous year. In 2009, even fewer companies decreased their dividend payments. Only 1,2% of the changes were decreases. The amount of companies that have not changed their dividend from 2008 to 2009 still stands for 30.2% while the amount of increases in dividend has increased and now stands for 68,5% of the changes from 2008 to 2009. Furthermore, in 2010, we can see that the amount of dividend decreases has raised to 11,1%, while both the increases and the ones that have not changed stands for 63,6% and 25,3% respectively. In 2011, there has been a drastic change in the dividend payout, decreases stands for 48,8% of the changes while the amount of increases have decreased to 19,1% of the changes in dividend. The amount of no changes have increased slightly to 32,1%. The most amounts of payouts where there is no change from the previous year occurred in 2012. That stood for 48,1% of the changes in 2012. The amount of decreases in dividend payouts declined to 13,6% while the amount of increases raised to 38,3%.

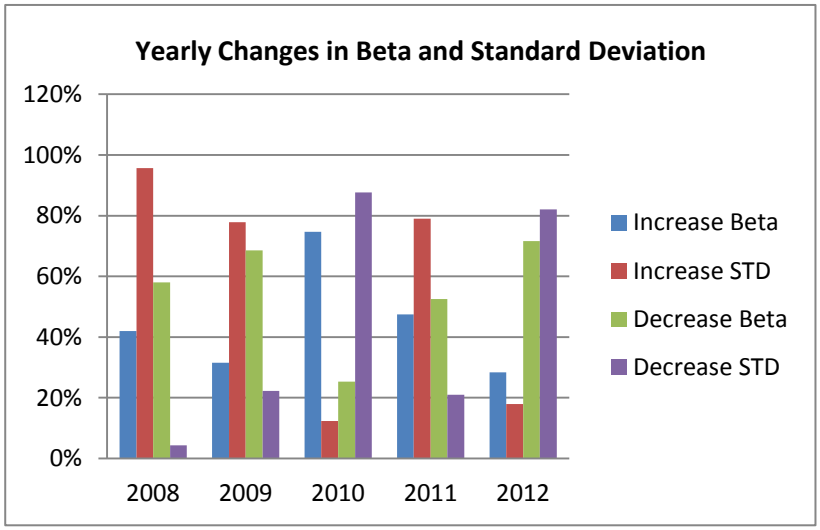

Figure 17 - Yearly Changes in Beta and STD

As we have studied the changes in dividend for each year, we are also examining how the standard deviation and beta have changed throughout the time period. As we can see from the graph, there have been quite heavy changes in both beta and standard deviation from year to year. By studying the graph, we can see how the volatility measures have changed each year varies widely and hence, we can conclude that the relationship between beta and standard deviation differs each year and our results therefore are year dependent.

In 2008, the increases in standard deviation are notably higher than the amount of increases in beta. Consequently, the decreases in beta are many more than the decreases in standard deviation.

In 2009, the increases in both beta and standard deviation are fewer, whereas there have been more increases in beta as well as standard deviation compared to 2008. The standard deviation is however showing fewer decreases than beta. Furthermore, the standard deviation is showing more increases than beta in 2009.

In 2010, the decreases in standard deviation have raised extensively. Decreases in beta on the other hand have fallen compared to previous years. Most notably this year besides the large number of decreases in standard deviation is the large amount of increases in beta. There has been a great increase in the amount of increases in beta compared to the amount of increases in standard deviation which has fallen compared to previous years.

Looking at 2011, we see that the amount of increases in standard deviation has increased whereas the amount of increases in beta has declined. Compared to previous years, the amounts of decreases in standard deviations have become less while the decreases in beta have increased compared to 2010.

The amounts of decreases in beta and standard deviation have risen in 2012, while increases in both beta and standard deviation has decreased from 2011 to 2012.

5.2 - Normality Testing

The first step in our empirical study is to test for normal distribution of the scale variables. That is done because depending on whether the data is normal or not, different statistical tests would have to be used. If findings would show that the data is normally distributed, we would test for correlation as well as conduct linear regression in order to find all the results we need in order to draw a conclusion from the findings. If tests show that the data is not normally distributed on the other hand, other tests have to be conducted in order to gain accurate results. We have conducted normality tests for changes in beta, changes in standard deviation and changes in dividend for each year as well as for a combination of all years.

When the null hypothesis is rejected, that is when the p-value is lower than 0,05 it indicates that the data is not normally distributed. The lower the p-value the stronger is the evidence against the null hypothesis of normal distribution, as such we reject the null hypothesis in favor of the alternative hypothesis.

For the normality testing, two different tests will be utilized: the Kolmogorov-Smirnov normality test and the Shapiro-Wilk normality test.

The following table shows the significance of the normality tests for the variable of changes in beta.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Change in Beta 2008	,496	162	,000	,060	162	,000
Change in Beta 2009	,264	162	,000	,410	162	,000
Change in Beta 2010	,353	162	,000	,483	162	,000
Change in Beta 2011	,239	162	,000	,541	162	,000
Change in Beta 2012	,173	162	,000	,790	162	,000

a. Lilliefors Significance Correction

Table 1 - Normality Change in Beta Each Year

This table tells us that none of the changes in beta in any of the years are normally distributed. All of the significance values are 0,000, which concludes that there is strong evidence against the null hypothesis. Therefore, we cannot conclude that the data is normally distributed.

After testing for normality in changes in beta, we are checking for normality in changes in standard deviation each year between 2008 and 2012.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Change in SD 2008	,050	162	,200*	,991	162	,353
Change in SD 2009	,127	162	,000	,893	162	,000
Change in SD 2010	,086	162	,005	,938	162	,000
Change in SD 2011	,065	162	,092	,956	162	,000
Change in SD 2012	,154	162	,000	,816	162	,000

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 2 - Normality and Change in SD Each Year

Testing for normality in changes in standard deviation, we found that Kolmogorov-Smirnov tests concludes a significance value of 0,200 in 2008, and the Shapiro-Wilk test concludes a value of 0,353 that same year. We can therefore assume that the changes in standard deviation in 2008 are normally distributed. Examining the results from the following years, we find that the Kolmogorov-Smirnov test concludes that the changes in standard deviation in 2011 are significant (0,092) and thus would be normally distributed, whereas the Shapiro-Wilk test argues that it is not (0,000). All other years are concluded non-normally distributed with consensus between both tests.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Change in Dividend 2007	,254	162	,000	,657	162	,000
Change in Dividend 2008	,309	162	,000	,483	162	,000
Change in Dividend 2009	,233	162	,000	,783	162	,000
Change in Dividend 2010	,180	162	,000	,900	162	,000
Change in Dividend 2011	,276	162	,000	,820	162	,000

a. Lilliefors Significance Correction

Table 3 - Normality and Change in Dividend Each Year

When testing for normality in changes in dividend for each year, we find no normal distribution neither using the Kolmogorov-Smirnov nor Shapiro-Wilk normality tests. The significance value shows 0,000 for each and every year. That means that we can conclude that the changes in dividend data are not normally distributed.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Change Beta 2008-2012	,429	814	,000	,040	814	,000
Change SD 2008-2012	,108	814	,000	,943	814	,000
Change Dividend 2007-2011	,243	814	,000	,715	814	,000

a. Lilliefors Significance Correction

Table 4 - Normality and Changes in Beta, SD and Dividend All Years

To see if the data is normally distributed when the whole sample period is examined, we have run the normality tests for beta, standard deviation and dividend for all years combined. Both the Kolmogorov-Smirnov and Shapiro-Wilk concludes that the data is

not normally distributed.

Referring to the statistical tests that have been conducted in order to test for normal distribution, we can conclude that the data is not normally distributed. The only exceptions are for the changes in standard deviation in 2008 and 2011, which indicate evidence of a normal distribution. Looking at the total sample, that is changes in beta, standard deviation and dividend for all years, we can conclude that the data is not normally distributed and therefore the linear regression analysis will not be a good choice for us to proceed with.

5.3 – Correlation

In order to test for correlation, two different tests have been conducted. The first table shows the Pearson Correlation which is a parametric test. The second table displays the non-parametric test Spearman's rho. Using both of these tests we will make our results more reliable. Seeing that the results of both tests are very similar, the evidence is stronger than if only one test would be performed.

5.3.1 - Changes in Beta and Changes in Dividend

2008

Correlations

		Change in Beta 2008	Change in Dividend 2007
Change in Beta 2008	Pearson Correlation	1	,006
	Sig. (2-tailed)		,942
	N	162	162
Change in Dividend 2007	Pearson Correlation	,006	1
	Sig. (2-tailed)	,942	
	N	162	162

Table 5 - Pearson Correlation Change in Beta and Dividend 2008

Correlations

			Change in Beta 2008	Change in Dividend 2007
Spearman's rho	Change in Beta 2008	Correlation Coefficient	1,000	-,038
		Sig. (2-tailed)	.	,628
		N	162	162
	Change in Dividend 2007	Correlation Coefficient	-,038	1,000
		Sig. (2-tailed)	,628	.
		N	162	162

Table 6 - Spearman's rho Correlation Change in Beta and Dividend 2008

Both Pearson's Correlation and Spearman's rho show correlation coefficients that are very close to 0 (0.006 and -0.038) with extremely high p-values (0.942 and 0.628). The null hypothesis of r=0 cannot be rejected. Consequently, with a very high probability, there was no correlation between the changes in dividends and changes in beta from 2007 to 2008.

2009

Correlations

		Change in Beta 2009	Change in Dividend 2008
Change in Beta 2009	Pearson Correlation	1	,114
	Sig. (2-tailed)		,149
	N	162	162
Change in Dividend 2008	Pearson Correlation	,114	1
	Sig. (2-tailed)	,149	
	N	162	162

Table 7 - Pearson Correlation Change in Beta and Dividend in 2009

Correlations

			Change in Beta 2009	Change in Dividend 2008
Spearman's rho	Change in Beta 2009	Correlation Coefficient	1,000	,129
		Sig. (2-tailed)	.	,102
		N	162	162
	Change in Dividend 2008	Correlation Coefficient	,129	1,000
		Sig. (2-tailed)	,102	.
		N	162	162

Table 8 - Spearman's rho Correlation Change in Beta and Dividend 2009

Again, both correlation coefficients are close to 0, although the Spearman's rho coefficient is somewhat higher (0,129). Also, the p-values are quite high (0,149 for Pearson's and 0,102 for Spearman's), as such we cannot reject the null hypothesis of r=0. Consequently, with a very high probability, there was no correlation between the changes in dividends and changes in beta from 2008 to 2009.

2010

Correlations

		Change in Beta 2010	Change in Dividend 2009
Change in Beta 2010	Pearson Correlation	1	,034
	Sig. (2-tailed)		,664
	N	162	162
Change in Dividend 2009	Pearson Correlation	,034	1
	Sig. (2-tailed)	,664	
	N	162	162

Table 9 - Pearson Correlation Change in Beta and Dividend in 2010

Correlations

			Change in Beta 2010	Change in Dividend 2009
Spearman's rho	Change in Beta 2010	Correlation Coefficient	1,000	,014
		Sig. (2-tailed)	.	,860
		N	162	162
	Change in Dividend 2009	Correlation Coefficient	,014	1,000
		Sig. (2-tailed)	,860	.
		N	162	162

Table 10 - Spearman's rho Correlation Change in Beta and Dividend 2010

The correlation coefficients for both tests are very close to 0 indicating no correlation.

The p-values are as well very high, meaning that the coefficients could have occurred by chance alone. Therefore, we cannot reject null hypothesis of r=0. Consequently, with a very high probability, there was no correlation between the changes in dividends and changes in beta from 2009 to 2010.

2011

Correlations

		Change in Beta 2011	Change in Dividend 2010
Change in Beta 2011	Pearson Correlation	1	,059
	Sig. (2-tailed)		,458
	N	162	162
Change in Dividend 2010	Pearson Correlation	,059	1
	Sig. (2-tailed)	,458	
	N	162	162

Table 11 - Pearson Correlation Change in Beta and Dividend in 2011

Correlations

			Change in Beta 2011	Change in Dividend 2010
Spearman's rho	Change in Beta 2011	Correlation Coefficient	1,000	,040
		Sig. (2-tailed)	.	,617
		N	162	162
	Change in Dividend 2010	Correlation Coefficient	,040	1,000
		Sig. (2-tailed)	,617	.
		N	162	162

Table 12 - Spearman's rho Correlation Change in Beta and Dividend in 2011

The same conclusion can be made for the correlation in 2011 as in 2010

2012

Correlations

		Change in Beta 2012	Change in Dividend 2011
Change in Beta 2012	Pearson Correlation	1	-,034
	Sig. (2-tailed)		,663
	N	162	162
Change in Dividend 2011	Pearson Correlation	-,034	1
	Sig. (2-tailed)	,663	
	N	162	162

Table 13 - Pearson Correlation Change in Beta and Dividend in 2012

Correlations

			Change in Beta 2012	Change in Dividend 2011
Spearman's rho	Change in Beta 2012	Correlation Coefficient	1,000	,016
		Sig. (2-tailed)	.	,841
		N	162	162
	Change in Dividend 2011	Correlation Coefficient	,016	1,000
		Sig. (2-tailed)	,841	.
		N	162	162

Table 14 - Spearman's rho Correlation Change in Beta and Dividend 2012

Again, the correlation coefficients are very close to 0 with very high p-values. The null hypothesis of r=0 cannot be rejected and as such we can conclude with a high probability that changes in dividends and changes in beta from 2011 to 2012 are not correlated.

5.3.2 Changes in Standard Deviation and Changes in Dividend

2008

Correlations

		Change in SD 2008	Change in Dividend 2007
Change in SD 2008	Pearson Correlation	1	-,102
	Sig. (2-tailed)		,199
	N	162	162
Change in Dividend 2007	Pearson Correlation	-,102	1
	Sig. (2-tailed)	,199	
	N	162	162

Table 15 - Pearson Correlation Change in Standard Deviation and Dividend in 2008

Correlations

			Change in SD 2008	Change in Dividend 2007
Spearman's rho	Change in SD 2008	Correlation Coefficient	1,000	-,020
		Sig. (2-tailed)	.	,801
		N	162	162
	Change in Dividend 2007	Correlation Coefficient	-,020	1,000
		Sig. (2-tailed)	,801	.
		N	162	162

Table 16 - Spearman's rho Correlation Change in Standard Deviation and Dividend in 2008

The correlation coefficients between changes in standard deviation and changes in dividend in 2008 are low for both Pearson's and Spearman's rho, although the correlation coefficient in Pearson's is a bit higher (-0.102 respectively -0.020 for Spearman's). The p-values are well-above 0.05 for both coefficients and therefore we cannot reject the null hypothesis of r=0, consequently, with a very high probability, there was no correlation between the changes in dividends and changes in standard deviation from 2007 to 2008.

2009

Correlations

		Change in SD 2009	Change in Dividend 2008
Change in SD 2009	Pearson Correlation	1	,115
	Sig. (2-tailed)		,144
	N	162	162
Change in Dividend 2008	Pearson Correlation	,115	1
	Sig. (2-tailed)	,144	
	N	162	162

Table 17 - Pearson Correlation Change in Standard Deviation and Dividend in 2009

Correlations

			Change in SD 2009	Change in Dividend 2008
Spearman's rho	Change in SD 2009	Correlation Coefficient	1,000	,087
		Sig. (2-tailed)	.	,272
		N	162	162
	Change in Dividend 2008	Correlation Coefficient	,087	1,000
		Sig. (2-tailed)	,272	.
		N	162	162

Table 18 - Spearman's rho Correlation Change in Standard Deviation and Dividend in 2009

Again, values of the correlation coefficients are close to 0 and the p-values for them are high (0.144 and 0.272). Therefore we cannot reject the null hypothesis of r=0. Consequently, with a very high probability, there was no correlation between the changes in dividends and changes in standard deviation from 2008 to 2009.

2010

Correlations

		Change in SD 2010	Change in Dividend 2009
Change in SD 2010	Pearson Correlation	1	-,036
	Sig. (2-tailed)		,648
	N	162	162
Change in Dividend 2009	Pearson Correlation	-,036	1
	Sig. (2-tailed)	,648	
	N	162	162

Table 19 - Pearson Correlation Change in Standard Deviation and Dividend in 2010

Correlations

			Change in SD 2010	Change in Dividend 2009
Spearman's rho	Change in SD 2010	Correlation Coefficient	1,000	-,024
		Sig. (2-tailed)	.	,766
		N	162	162
	Change in Dividend 2009	Correlation Coefficient	-,024	1,000
		Sig. (2-tailed)	,766	.
		N	162	162

Table 20 - Spearman's rho Correlation Change in Standard Deviation and Dividend in 2010

For the correlation between changes in standard deviation and changes in dividend in 2010 both Pearson's correlation test and Spearman's rho show very similar results. The coefficients are negative but still extremely close to 0 which indicate that there is no correlation. Moreover, the p-values are high (0,648 and 0,766) leading to the fact we cannot reject the null hypothesis of r=0. As such, we can conclude with high probability that there were no correlation between the two variables from 2009 to 2010.

2011

Correlations

		Change in SD 2011	Change in Dividend 2010
Change in SD 2011	Pearson Correlation	1	-,071
	Sig. (2-tailed)		,368
	N	162	162
Change in Dividend 2010	Pearson Correlation	-,071	1
	Sig. (2-tailed)	,368	
	N	162	162

Table 21 - Pearson Correlation Change in Standard Deviation and Dividend in 2011

Correlations

			Change in SD 2011	Change in Dividend 2010
Spearman's rho	Change in SD 2011	Correlation Coefficient	1,000	-,087
		Sig. (2-tailed)	.	,269
		N	162	162
	Change in Dividend 2010	Correlation Coefficient	-,087	1,000
		Sig. (2-tailed)	,269	.
		N	162	162

Table 22 - Spearman's rho Correlation Change in Standard Deviation and Dividend in 2011

The same can be said for the year 2011 as for 2010. Although the p-values are lower (0.368 and 0.269) in 2011 than 2010, we can still not reject the null hypothesis of r=0. Therefore we can with high probability conclude that there was no correlation between the two variables from 2010 to 2011.

2012

Correlations

		Change in SD 2012	Change in Dividend 2011
Change in SD 2012	Pearson Correlation	1	-,029
	Sig. (2-tailed)		,713
	N	162	162
Change in Dividend 2011	Pearson Correlation	-,029	1
	Sig. (2-tailed)	,713	
	N	162	162

Table 23 - Pearson Correlation Change in Standard Deviation and Dividend in 2012

Correlations

			Change in SD 2012	Change in Dividend 2011
Spearman's rho	Change in SD 2012	Correlation Coefficient	1,000	-,107
		Sig. (2-tailed)	.	,173
		N	162	162
	Change in Dividend 2011	Correlation Coefficient	-,107	1,000
		Sig. (2-tailed)	,173	.
		N	162	162

Table 24 - Spearman's rho Correlation Change in Standard Deviation and Dividend in 2012

Again, the p-values are high both for Pearson's coefficient (0,713) and Spearman's rho coefficient (0,173). Therefore, we cannot reject the null hypothesis of r=0 and as such we can with high probability conclude that there was no correlation between changes in standard deviation and changes in dividend from 2011 to 2012.

5.3.3 - Changes in Beta and Changes in Dividend 2008-2012

When testing the correlation between changes in beta and changes in dividend over the whole time period covered, 2008-2012 the correlation coefficients for both Pearson's and Spearman's rho are still close to 0 (0,014 respectively 0,024) as can be seen in the table below. The p-values for the coefficients are 0,692 for the Pearson coefficient and 0,49 for the Spearman's rho coefficient. Thus, we cannot reject the null hypothesis of r=0 during 2008-2012. As such, we can with high probability conclude that there was no correlation between the two variables during this time period.

Correlations

		Change Beta 2008-2012	Change Dividend 2007-2011
Change Beta 2008-2012	Pearson Correlation	1	,014
	Sig. (2-tailed)		,692
	N	814	814
Change Dividend 2007-2011	Pearson Correlation	,014	1
	Sig. (2-tailed)	,692	
	N	814	814

Table 25 - Pearson Correlation Changes in Beta and Changes in Dividend All Years

Correlations

			Change Beta 2008-2012	Change Dividend 2007-2011
Spearman's rho	Change Beta 2008-2012	Correlation Coefficient	1,000	,024
		Sig. (2-tailed)	.	,490
		N	814	814
	Change Dividend 2007-2011	Correlation Coefficient	,024	1,000
		Sig. (2-tailed)	,490	.
		N	814	814

Table 26 - Spearman's rho Correlation Changes in Beta and Changes in Dividend All Years

5.3.4 - Changes in Standard Deviation and Changes in Dividend 2008-2012

Correlations

		Change SD 2008-2012	Change Dividend 2007-2011
Change SD 2008-2012	Pearson Correlation	1	-,018
	Sig. (2-tailed)		,604
	N	814	814
Change Dividend 2007-2011	Pearson Correlation	-,018	1
	Sig. (2-tailed)	,604	
	N	814	814

Table 27 - Pearson Correlation Changes in Standard Deviation and Changes in Dividend All Years

Correlations

			Change SD 2008-2012	Change Dividend 2007-2011
Spearman's rho	Change SD 2008-2012	Correlation Coefficient	1,000	-,052
		Sig. (2-tailed)	.	,137
		N	814	814
	Change Dividend 2007-2011	Correlation Coefficient	-,052	1,000
		Sig. (2-tailed)	,137	.
		N	814	814

Table 28 - Spearman's rho Correlation Changes in Standard Deviation and Changes in Dividend All Years

Here we have tested the correlation between changes in standard deviation and changes in dividend during the whole time period 2008-2012. Again the coefficient values are close to 0 with p-values of 0,604 for Pearson's coefficient and 0,137 for Spearman's rho. Consequently the null hypothesis of r=0 cannot be rejected and we can with high probability conclude that there has been no correlation between changes in standard deviation and changes in dividend during the time period.

5.3.5 - Changes in Beta and Changes in Dividend in Large Cap Segment

To answer the sub-questions regarding differences between size segments we have conducted correlation tests among the different capitalization segments. In the table below the results of the correlation tests for changes in beta and changes in dividend in the large cap segment can be seen.

Correlations

		Change Beta LC	Change Dividend LC
Change Beta LC	Pearson Correlation	1	,035
	Sig. (2-tailed)		,565
	N	279	279
Change Dividend LC	Pearson Correlation	,035	1
	Sig. (2-tailed)	,565	
	N	279	279

Table 29 - Pearson Correlation Changes in Beta and Changes in Dividend in Large Cap Segment

Correlations

			Change Beta LC	Change Dividend LC
Spearman's rho	Change Beta LC	Correlation Coefficient	1,000	,030
		Sig. (2-tailed)	.	,620
		N	279	279
	Change Dividend LC	Correlation Coefficient	,030	1,000
		Sig. (2-tailed)	,620	.
		N	279	279

Table 30 - Spearman's rho Correlation Changes in Beta and Changes in Dividend in Large Cap Segment

The results do not differ that much from the previous results when only examining the correlation between changes in beta and changes in dividend of the whole market. The correlation coefficients are still close to 0 and the p-values for the coefficients are 0,565 for the Pearson coefficient and 0,62 for the Spearman's rho. The null hypothesis

of r=0 in the large cap segment can therefore not be rejected. This indicates that there was no correlation between changes in beta and dividends in the large cap segment during 2008-2012.

5.3.6 - Changes in Standard Deviation and Changes in Dividend in Large Cap Segment

Correlations

		Change SD LC	Change Dividend LC
Change SD LC	Pearson Correlation	1	-,029
	Sig. (2-tailed)		,626
	N	279	279
Change Dividend LC	Pearson Correlation	-,029	1
	Sig. (2-tailed)	,626	
	N	279	279

Table 31 - Pearson Correlation Changes in Standard Deviation and Changes in Dividend in Large Cap Segment

Correlations

			Change SD LC	Change Dividend LC
Spearman's rho	Change SD LC	Correlation Coefficient	1,000	-,086
		Sig. (2-tailed)	.	,151
		N	279	279
	Change Dividend LC	Correlation Coefficient	-,086	1,000
		Sig. (2-tailed)	,151	.
		N	279	279

Table 32 - Spearman's rho Correlation Changes in Standard Deviation and Changes in Dividend in Large Cap Segment

When exchanging changes in beta to changes in standard deviation the results are still very much alike. The null hypothesis of r=0 for changes in standard deviation and changes in dividend in the large cap segment cannot be rejected. As such we can with high probability conclude that there has not been any correlation between these two variables in the large cap segment during 2008-2012.

5.3.7 - Changes in Beta and Changes in Dividend in Mid Cap Segment

Correlations

		Change Beta MC	Change Dividend MC
Change Beta MC	Pearson Correlation	1	,022
	Sig. (2-tailed)		,750
	N	214	214
Change Dividend MC	Pearson Correlation	,022	1
	Sig. (2-tailed)	,750	
	N	214	214

Table 33 - Pearson Correlation Changes in Standard Deviation and Changes in Dividend in Large Cap Segment

Correlations

			Change Beta MC	Change Dividend MC
Spearman's rho	Change Beta MC	Correlation Coefficient	1,000	,001
		Sig. (2-tailed)	.	,991
		N	214	214
	Change Dividend MC	Correlation Coefficient	,001	1,000
		Sig. (2-tailed)	,991	.
		N	214	214

Table 34 - Spearman's rho Correlation Changes in Standard Deviation and Changes in Dividend in Large Cap Segment

The results of the correlation between changes in beta and changes in dividend in the mid cap segment can be said to be very similar to the large cap segment. Coefficient values very close to 0 and very high p-values. Consequently, we cannot reject the null hypothesis of r=0 in the mid cap segment, indicating that there has been no correlation between the two variables in the mid cap segment during 2008-2012.

5.3.8 - Changes in Standard Deviation and Changes in Dividend in Mid Cap Segment

Correlations

		Change SD MC	Change Dividend MC
Change SD MC	Pearson Correlation	1	,018
	Sig. (2-tailed)		,794
	N	214	214
Change Dividend MC	Pearson Correlation	,018	1
	Sig. (2-tailed)	,794	
	N	214	214

Table 35 - Pearson Correlation Changes in Standard Deviation and Changes in Dividend in Mid Cap Segment

Correlations

			Change SD MC	Change Dividend MC
Spearman's rho	Change SD MC	Correlation Coefficient	1,000	,007
		Sig. (2-tailed)	.	,925
		N	214	214
	Change Dividend MC	Correlation Coefficient	,007	1,000
		Sig. (2-tailed)	,925	.
		N	214	214

Table 36 - Spearman's rho Correlation Changes in Standard Deviation and Changes in Dividend in Mid Cap Segment

Again, when exchanging change in beta for change in standard deviation the results are still insignificant, as the p-values for the regression coefficients are very high (0,794 for Pearson's and 0,925 for Spearman's). Therefore we cannot reject the null hypothesis of r=0 in the mid cap segment, indicating that there has been no correlation between the two variables in the mid cap segment during 2008-2012.

5.3.9 - Changes in Beta and Changes in Dividend in Small Cap Segment

Correlations

		Change Beta SC	Change Dividend SC
Change Beta SC	Pearson Correlation	1	,039
	Sig. (2-tailed)		,490
	N	319	319
Change Dividend SC	Pearson Correlation	,039	1
	Sig. (2-tailed)	,490	
	N	319	319

Table 37 - Pearson Correlation Changes in Beta and Changes in Dividend in Small Cap Segment

Correlations

			Change Beta SC	Change Dividend SC
Spearman's rho	Change Beta SC	Correlation Coefficient	1,000	,030
		Sig. (2-tailed)	.	,593
		N	319	319
	Change Dividend SC	Correlation Coefficient	,030	1,000
		Sig. (2-tailed)	,593	.
		N	319	319

Table 38 - Spearman's rho Correlation Changes in Beta and Changes in Dividend in Small Cap Segment

Looking at the correlation between changes in beta and changes in dividend in the small cap segment the findings are still not much different from the findings when examining the large and mid cap segments. In the table one can see that Pearson's coefficient is only 0,039 and Spearman's rho coefficient is 0,03, indicating no correlation. The p-values are 0,49 respectively 0,593, well-above the significance level that is. As such, the null hypothesis of r=0 in the small cap segment cannot be rejected. This indicates that there has been no correlation between changes in beta and changes in dividend in the small cap segment during 2008-2012.

5.3.10 - Changes in Standard Deviation and Changes in Dividend in Small Cap Segment

Correlations

		Change SD SC	Change Dividend SC
Change SD SC	Pearson Correlation	1	-,030
	Sig. (2-tailed)		,591
	N	319	319
Change Dividend SC	Pearson Correlation	-,030	1
	Sig. (2-tailed)	,591	
	N	319	319

Table 39 - Pearson Correlation Changes in Standard Deviation and Changes in Dividend in Small Cap Segment

Correlations

			Change SD SC	Change Dividend SC
Spearman's rho	Change SD SC	Correlation Coefficient	1,000	-,044
		Sig. (2-tailed)	.	,435
		N	319	319
	Change Dividend SC	Correlation Coefficient	-,044	1,000
		Sig. (2-tailed)	,435	.
		N	319	319

Table 40 - Spearman's rho Correlation Changes in Standard Deviation and Changes in Dividend in Small Cap Segment

The findings for the correlation between changes in standard deviation and changes in dividend in the small cap segment are similar to the findings of the correlation between changes in beta and changes in dividend. The correlation coefficients are again very close to 0 with p-values of 0.591 respectively 0.435 as can be seen in the table above. Therefore, the null hypothesis of r=0 in the small cap segment cannot be rejected. This indicates that there has been no correlation between changes in standard deviation and changes in dividend in the small cap segment during 2008-2012.

5.4 – Logistic Regression Analysis

As mentioned in chapter 4, if we found no correlation amongst our variables and/or the variables were not distributed normally the next step would, instead of conducting linear regression, be to conduct logistic regression in order to deepen the findings of this research. Logistic regression is in this case a means to circumvent the problem of non-normal data distribution as well as making the variables extremely robust.

In this section the results of the multiple logistic regression analysis will be presented. First the results with all control variables (i.e. years and size segments) and the change in beta as the dependent variable are introduced followed by the results of the logistic regression with change in standard deviation as dependent variable. These results will then be followed by logistic regression models where we exclude control variables, first the year and then the size segments.

The variables in the models are indicator variables, or also commonly known as dummy variables. As such, we have to exclude one variable in each indicator category in order to avoid multicollinearity. The excluded variable therefore becomes the reference that the estimated parameters of the model are compared to. Small cap will be the reference for the size category, the year 2012 will be the reference for the year category and finally, no change in dividend will be the reference for the change in dividend category. For example, if we find the parameter for large cap is equal to β=0,509 the interpretation would be that large cap have a larger impact, in the positive direction on the dependent variable compared to small cap. Had it instead been β=-0,509 the reverse would be said, small cap have a larger impact on the dependent variable compared to large cap.

5.4.1 - Model 1 – Change in Beta as Dependent Variable

In the table below the coefficients of the parameters of the model are presented with their respective standard error. The column labeled "Wald" gives the value for the Wald chi-square, and in the column labeled "Sig" the p-value for the hypothesis that

the coefficient is equal to 0. If the p-value is lower than 0,05 we can reject the hypothesis that the coefficient has no effect on the dependent variable.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	-,134	,178	,570	1	,450	,874
	DecreaseDividend	-,215	,247	,756	1	,385	,807
	Year2008	,626	,242	6,699	1	,010	1,870
	Year2009	,165	,249	,436	1	,509	1,179
	Year2010	2,060	,257	64,189	1	,000	7,843
	Year2011	,887	,251	12,487	1	,000	2,427
	LargeCap	,509	,180	7,994	1	,005	1,664
	MidCap	,164	,191	,745	1	,388	1,179
	Constant	-1,072	,213	25,453	1	,000	,342

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend, Year2008, Year2009, Year2010, Year2011, LargeCap, MidCap.

Table 41 - Logistic Regression, Change in Beta as Dependent Variable

In the table above we find that year 2008, 2010 and 2011 compared to 2012 have a significantly positive impact on an increase in beta and thus negative impact on a decrease in beta. Large cap have, compared to small cap, a predictive ability on an increase or decrease in beta. We can reject the null hypothesis that the coefficients are equal to 0 as the p-value for these coefficients have a lower value than 0,05. The coefficients for increase respectively decrease in dividend are not significant, therefore fail to reject the null hypothesis for these coefficients being equal to 0. This indicates no predictive ability of changes in dividend, compared to no change in dividend, on changes in beta.

5.4.2 - Model 2 – Change in Standard Deviation as Dependent Variable

In this regression model we have switched the dependent variable of change in beta, to change in standard deviation but all other explanatory variables are kept the same.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	,118	,236	,249	1	,617	1,125
	DecreaseDividend	,379	,303	1,566	1	,211	1,461
	Year2008	4,660	,443	110,594	1	,000	105,591
	Year2009	,288	,289	,996	1	,318	1,334
	Year2010	-,458	,321	2,043	1	,153	,632
	Year2011	2,773	,295	88,516	1	,000	16,014
	LargeCap	-,202	,234	,743	1	,389	,817
	MidCap	-,472	,254	3,470	1	,063	,624
	Constant	-1,443	,255	31,950	1	,000	,236

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend, Year2008, Year2009, Year2010, Year2011, LargeCap, MidCap.

Table 42 - Logistic Regression, Change in Standard Deviation as Dependent Variable

Again, neither an increase nor a decrease in dividend can compared to no change in dividend explains any changes in standard deviation as the coefficients are insignificant. Therefore, we fail to reject the null hypotheses that these coefficients are equal to 0, and consequently, do not have predictive ability on changes in standard deviation. As can be seen, both the variables for year 2008 and 2011 have high,

positive coefficient values with low p-values, which indicate that these years were especially strong, compared to year 2012, in explaining increases in standard deviation. This corresponds to the years of great financial turmoil. Moreover, the coefficients for size segment are not significant at the 0,05 level, as such we cannot conclude that size explain any change in standard deviation.

5.4.3 - Model 3 – Change in Beta without Years as Explanatory Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	,028	,161	,031	1	,860	1,029
	DecreaseDividend	,046	,218	,044	1	,834	1,047
	LargeCap	,423	,169	6,270	1	,012	1,527
	MidCap	,139	,179	,601	1	,438	1,149
	Constant	-,412	,145	8,045	1	,005	,662

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend, LargeCap, MidCap.

Table 43 - Logistic Regression, Change in Beta without Years as Explanatory Variables

When removing the years as explanatory variables in the model, the results are similar to the ones we got in logistic regression model 1. Changes in dividend, compared to no change in dividend, do not hold any explanation for changes in beta, as the coefficients are insignificant. Rather, only being a company in the large cap segment can compared to small cap, holding the other variables in this model constant, explain increases in beta as the regression coefficient for the variable large cap is positive and significant.

5.4.4 - Model 4 – Change in Standard Deviation without Years as Explanatory Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	,003	,162	,000	1	,984	1,003
	DecreaseDividend	,818	,221	13,661	1	,000	2,266
	LargeCap	-,088	,170	,267	1	,605	,916
	MidCap	-,216	,180	1,432	1	,231	,806
	Constant	-,227	,144	2,485	1	,115	,797

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend, LargeCap, MidCap.

Table 44 - Logistic Regression, Change in Standard Deviation without Years as Explanatory Variables

When we exchange the dependent variable of change in beta, to standard deviation, but keep the other variables from the previous model the result becomes quite different. In this model, none of the regression coefficients are significant in explaining any changes in standard deviation, except for decreases in dividends. The p-value is smaller than 0,01, and the beta value for the coefficient is highly positive (0,818 and 2,266 for the exponential beta value) which indicates strong evidence for decreases in dividend compared to no change in dividend, in explaining increases in standard deviation.

5.4.5 - Model 5 – Change in Beta without Size as Explanatory Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	-,031	,173	,033	1	,856	,969
	DecreaseDividend	-,163	,244	,445	1	,505	,850
	Year2008	,595	,240	6,139	1	,013	1,813
	Year2009	,137	,248	,306	1	,580	1,147
	Year2010	2,012	,255	62,427	1	,000	7,480
	Year2011	,878	,249	12,443	1	,000	2,406
	Constant	-,891	,193	21,379	1	,000	,410

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend, Year2008, Year2009, Year2010, Year2011.

Table 45 - Logistic Regression, Change in Beta without Size as Explanatory Variables

When we insert the years into the regression model again and instead exclude the size segments as explanatory variables neither the coefficient for a decrease in dividend nor an increase in dividend are significant, compared to no change in dividend. We therefore fail to reject the null hypotheses for these coefficients being equal to 0. Consequently, they do not hold any explanation for the changes in beta. In this model, only year 2008, 2010 and 2011 are significant according to the p-value with positive regression coefficients, which indicates that these years are stronger in explaining increases in beta than year 2012.

5.4.6 - Model 6 – Change in Standard Deviation without Size as Explanatory Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	,083	,230	,130	1	,718	1,087
	DecreaseDividend	,389	,303	1,655	1	,198	1,476
	Year2008	4,642	,442	110,487	1	,000	103,731
	Year2009	,298	,288	1,071	1	,301	1,347
	Year2010	-,448	,320	1,963	1	,161	,639
	Year2011	2,742	,293	87,811	1	,000	15,525
	Constant	-1,613	,235	47,004	1	,000	,199

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend, Year2008, Year2009, Year2010, Year2011.

Table 46 – Logistic Regression, Change in Standard Deviation without Size as Explanatory Variables

The explanatory variables are the same as in the previous regression model, however in this model we exchange the change in beta to the change in standard deviation as dependent variable. The results are similar to the model with change in beta as dependent variable, biggest difference is that the regression coefficient for the year 2010 have a p-value of 0,161 and is therefore not significant in explaining any changes in standard deviation. Again, neither decreases nor increases in dividend seem to explain changes in standard deviation. The regression coefficient values for year 2008 and 2011 are both high and positive as well as significant, this indicates that these year were especially strong in explaining increases in standard deviation compared to year

2012. This finding fits well with the finding in logistic regression model 2 we ran with change in standard deviation as dependent variable.

5.4.7 - Model 7 – Change in Beta without Size and Years as Explanatory Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	,107	,158	,459	1	,498	1,113
	DecreaseDividend	,089	,216	,169	1	,681	1,093
	Constant	-,277	,123	5,057	1	,025	,758

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend.

Table 47 - Logistic Regression, Change in Beta without Size and Years as Explanatory Variables

When removing all size segments and years as explanatory variables and let only changes in dividend be explanatory variables in the model, the changes in dividend are still not accepted to explain any changes in beta. The values of the regression coefficients are quite close to 0, (0,107 for increase in dividend and 0,089 for decrease in dividend) with p-values well-above 0,05 (0,498 respectively 0,681). Such values close to 0 and high p-values indicate a poor fit, and the variables of increase in dividend and decrease in dividend cannot, compared to no changes in dividend, explain any changes in beta. The null hypotheses of these coefficients being equal to 0 cannot be rejected.

5.4.8 - Model 8 – Change in Standard Deviation without Size and Years as Explanatory Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	IncreaseDividend	-,010	,159	,004	1	,949	,990
	DecreaseDividend	,818	,220	13,782	1	,000	2,266
	Constant	-,307	,123	6,200	1	,013	,735

a. Variable(s) entered on step 1: IncreaseDividend, DecreaseDividend.

Table 48 - Logistic Regression, Change in Standard Deviation without Size and Years as Explanatory Variables

In this model we insert change in standard deviation as dependent variable and insert only changes in dividend as explanatory variables. It is interesting to see that the coefficient for increase in dividend is close to 0 with a very high p-value, which indicates that increase in dividend compared to no changes in dividend, cannot explain change in standard deviation as we fail to reject null hypothesis of this coefficient being equal to 0. On the other hand, decreases in dividends have a positive, high coefficient value (0,818) with a low p-value (0,000). As such we can reject the null hypothesis for this coefficient meaning that decreases in dividends hold stronger explanation power on changes in standard deviation than no change in dividend does. As the coefficient value is positive it means that decreases in dividends may increase standard deviation.

5.5 – Summary of Results

Conducted Test	Result
Normality Test	*Non-normal distribution*
Correlation Test	*No correlation*
Logistic Regression	*No significance*

Table 49 - Summary of Results

First, we investigated if there was a relationship between changes in cash dividend and changes in return volatility using scale variables. When we found no significant results using these, we turned the scale variables into indicator variables and made logistic regression tests in order to make sure that our results are accurate. Therefore, we can argue that our results should be very robust. To summarize the empirical findings, we can conclude that the results indicate that the data is non-normal, there is no correlation between changes in cash dividend and changes in return volatility and the logistic regression tests were not significant. Hence, we found no significance in any of the tests that were conducted.

5.6 - Summary of Hypothesis Testing

Hypothesis 1

H_0: There is no correlation between changes in cash dividend and changes in beta during 2008-2012
H_a: There is correlation between changes in cash dividend and changes in beta during 2008-2012

We fail to reject H_0

Hypothesis 2

H_0: There is no correlation between changes in cash dividend and changes in standard deviation of return during 2008-2012
H_a: There is correlation between changes in cash dividend and changes in standard deviation of return during 2008-2012

We fail to reject H_0

Hypothesis 3-5

H_0: Correlation between changes in cash dividend and changes in beta does not exist in the size segment X (small, medium or large)
H_a: Correlation between changes in cash dividend and changes in beta does exist in the size segment X (small, medium or large)

We fail to reject H_0

Hypothesis 6-8

H_0: Correlation between changes in cash dividend and changes in standard deviation does not exist in the size segment X (small, medium or large)
H_a: Correlation between changes in cash dividend and changes in standard deviation does exist in the size segment X (small, medium or large)

We fail to reject H_0

Hypothesis 9-13

H_0: Correlation between changes in cash dividend and changes in beta does not exist in year X (2008, 2009, 2010, 2011, 2012)
H_a: Correlation between changes in cash dividend and changes in beta does exist in the year X (2008, 2009, 2010, 2011, 2012)

We fail to reject H_0

Hypothesis 13-17

H_0: Correlation between changes in cash dividend and changes in standard deviation does not exist in year X (2008, 2009, 2010, 2011, 2012)
H_a: Correlation between changes in cash dividend and changes in standard deviation does exist in the year X (2008, 2009, 2010, 2011, 2012)

We fail to reject H_0

Hypothesis 18

H_0: Changes in dividend does not explain changes in beta
H_a: Changes in dividend does explain changes in beta

We fail to reject H_0

Hypothesis 19

H_0: Changes in dividend does not explain changes in standard deviation
H_a: Changes in dividend does explain changes in standard deviation

We fail to reject H_0 when size segments and years are included in the regression model as explanatory variables. However, decreases in dividend have some explanation power on increases in standard deviation when years are excluded from the regression model as explanatory variables. This is also true in the regression model where both sizes and years are excluded.

Chapter 6 – Discussion

In this chapter we will use the theoretical frame of reference to facilitate the analysis and discussion of the findings. First, we will give a brief summary of the results from the empirical findings. Thereafter, the findings will be interpreted in the light of the dividend irrelevance theory. Next, we will discuss the signaling theory in relation to the results. Followed by discussion and interpretation of the findings based upon the agency theory, the bird-in-the-hand hypothesis and finally the clientele effect.

6.1 - Brief Summary of Results

The results indicate no correlation between changes in dividend and changes in beta/standard deviation. As such, no interdependence between changes in dividend payments and changes in return volatility seem to exist. Moreover, from the logistic regression analysis it is quite clear that changes in dividend do not hold any significant predictive ability on changes in beta and only on changes in standard deviation on two exceptions. Therefore, we deem that changes in dividends are not, when other explanatory variables such as years and market capitalization of the company are considered as well, able to explain changes in return volatility.

6.2 - Dividend Irrelevance Theory and the Empirical Findings

We failed to reject H_0 of hypotheses 1 through 19. Thus, the findings can be argued to be aligned with Miller and Modigliani's (1961) dividend irrelevance theory. As they debate that *"...given a firm's investment policy, the dividend payout policy it chooses to follow will affect neither the current price of its shares nor the total return to its shareholders"*(Miller and Modigliani, 1961, p.414). Since our volatility measures of beta and standard deviation are based upon stock returns, and we find no evidence that changes in dividend payout have interdependence with, nor an predictive ability on the volatility measures it could be seen as support that the dividend payout policy does not matter in determining shareholder wealth. Black and Scholes (1974, p.18) concluded that they were unable to prove that differences in dividend yield lead to differences in stock return, thus they were incapable of proving that dividend policy affect stock prices. One could speculate that our findings are similar to theirs as we are unable to find that changes in cash dividend lead to changes in return volatility for stocks listed on NASDAQ OMX Stockholm.

The findings suggest that from a shareholder's perspective there is no need to be concerned with firms' dividend payout policies. Rather, when aiming to diversify their portfolios it is enough for investors to look at the volatility measures, beta and standard deviation, and there is no need to consider the dividend policy of a firm. That is of course, if the investors are not specifically interested in dividend payouts for other reasons than diminishing return volatility. This also support Miller and Modigliani's idea that investors do not care specifically for a firm's dividend policy, because in the end, they can create their own "homemade dividends" through selling a portion of their stock to create dividend, or reversibly buying additional stocks with the dividend received if they prefer less dividend (Arnold, 2008, p. 842).

From the logistic regression analysis the different years seem to be quite strong in

explaining changes in return volatility, whereas changes in dividends compared to no changes does not. This could also be argued to support the dividend irrelevance theory. Especially, the results for the majority of the regression models indicate that year 2008 and 2011 are the strongest significantly explanatory variables for changes in return volatility. This comes as no surprise, going back to the graph in chapter 4 displaying the price index of OMXSPBI from 2007-2012 where we can see clear dips in 2008 as well as in the end of 2011. These years represent especially harsh economic times and, as such it makes sense that return volatility increases during those times.

Moreover, when comparing correlations between changes in dividend and changes in beta/standard deviation among size segments, we still found no differences from the other correlation tests covering all size segments. The correlation coefficient were close to 0 as well as insignificant. Therefore, there seems to be no interdependence between changes in cash dividend and changes in return volatility, no matter the companies' market capitalization. However, from some models in the logistic regression analysis we find that which size segment a company belongs to can help in explaining changes, especially increases, in return volatility. Companies in the large cap segment seem, according to our results, affect changes in return volatility more than companies in the small cap segment. One could believe that a company listed in the small cap segment would have higher return volatility as these companies are often not as old and established as the companies in the mid or large cap segments. High growth companies usually have low or no dividend payments during this phase, as profits often are reinvested into firm-specific projects. Large cap companies on the other hand often have higher as well as more stable, regular dividends. As such, companies in the small cap segment are often growth companies which often are associated with higher risk. That we find that large cap companies affect changes in return volatility more than small cap companies is therefore an interesting finding. Perhaps this is due to investors' awareness that companies in small cap are usually more risky, and as such they have more tolerance towards these firms resulting in a more stable return volatility. Whereas investors investing in large cap companies are less tolerant as they expect these firms to be stable, causing return volatility increases. If that is true, then it would mean that investors are not rational, which is one of the basic assumptions of the dividend irrelevance theory. Consequently, many of the findings seem to support the dividend irrelevance theory whereas some of them could be interpreted as contradicting it.

6.3 - Signaling Theory and the Empirical Findings

The signaling theory says that dividend can be used to signal a manager’s belief about future performance (DeAngelo et al., 1996, p.342). In our research, we did not find any relationship between changes in cash dividend and changes in return volatility neither in the correlation tests nor in the logistic regression analysis. This indicates that the signaling theory might not be present in our results. Rather, the findings could be thought of to contradict to the signaling theory. The signaling effect would have been easily applicable if we would have found a relationship between changes in cash dividend and changes in return volatility. That is because of the fact that the theory could be thought of to hypothesizes that when dividend increase, the volatility should decrease and when dividend decreases, the volatility should increase. Because we did not find that changes in dividend could explain changes in return volatility, we cannot argue that we found any evidence of the signaling effect. In other words, the findings

suggest that dividends might either not be used as a signal by managers and/or that investors might not regard dividends as a signal for the future outlook of the company. It can also be that the signaling effect is present, but that investors are rather confused regarding information contained in the signal and therefore do not react on these. We can therefore not conclude that the signaling effect is not present in our results.

The signaling theory is an old theory that has been widely discussed among researchers, investors, managers and many others. This theory does however date far back when the financial market was a whole lot different than it is today. It could therefore be hypothesized that as the financial market and the means one can use to keep track of it has changed, the signaling theory has become outdated. Another reason as to why it can be that the signaling theory might not be applicable anymore could be that as the climate has changed since the theory was built the modern investors have different ways of thinking and managing their investments than yesterdays investors had. Basically, perhaps investors behave differently now, than back when the theory was first introduced, and therefore, they no longer see the dividend as a signal. Moreover, one could argue that with dividends becoming more and more regular it takes the signaling effect away because the dividend is still distributed no matter the future outlook of the company.

As mentioned in chapter 3, Al-Malkawi et al., (2010, p.186) brought up two criteria that have to be fulfilled in order for the signaling theory to work. One was that managers have information that investors do not have and intend to convey it to the market. The second was that companies could not send false signals. Modern technology has made it possible for investors to access more information. Today's investors have quick access to various reliable sources that convey information about the stock market. Internet especially, has provided them with a source of information that makes it possible for them to get almost as informed as managers. Therefore, we can argue that the first criterion might no longer always applicable. As for the second criterion, sending false signals is difficult through modern technology. The fast and easy way for information to spread in modern times makes it hard to get away with sending these false signals. The signaling theory is, as mentioned, more or less based on the belief that managers have access to more information than investors do. Since the technology has made this gap between managers and investors smaller, the signaling effect could have become less applicable.

Miller and Rock (1985 p.1037) argued that previous studies by Watts (1973) and Gonedes (1978) had shown that past and current dividend did not signal anything about the future earnings. Since we could not conclude that the changes in dividend send any signals about the future earnings, one could assume that the argument of these previous researches might be correct. Our findings concluded that the signaling effect could not explain changes in volatility, but the signaling effect might explain how well the company is doing at the time the dividend is changed. Investors might then not trade when they face a decrease in dividend because they believe that the future is bright and the earnings will increase.

Looking at the size segments, we find that the same is true there. We do not find any evidence of the presence of the signaling effect in any of the size segments. One could believe that the changes in dividend should have had a slightly larger impact in the large cap segment since the dividends paid out in that size segment is often very steady and stable. Therefore, one could believe that a big change in dividend would

work as a signal to investors that something is out of the ordinary. We did however not find any evidence of that the effect is varying depending on the size segments, nor that there might be any signaling effect in any of them.

6.4 - Agency Costs and the Empirical Findings

As previously discussed the findings of this research could be seen to give support toward the dividend irrelevance theory. Accordingly, the findings may be discussed as contradicting the dividend relevance theories at hand. The agency theory basically examines the different problems that may arise between an agent and a principal, and the costs of solving them. Regarding business, the shareholders are seen as principals whereas the agents are the managers that are hired by the shareholders to act in their interest. (Jensen and Meckling, 1976, p.308).

By failing to reject hypotheses 1 through 19, our findings suggest that, of course agency costs may be present, but that there is a possibility that they are not that high that they have an impact on stock price movements, and then in turn on return volatility. If that is the case, perhaps this then could be due to that firms nowadays usually distribute dividends on a regular basis. In that case one explanation for the lowering of agency costs could be Easterbrook's findings (1984). He argued that firms are more scrutinized by professional institutions as they approach the capital markets to raise new capital. Subsequently, causing managers to act more in the interest of shareholders thus lowering agency costs. (Easterbrook, 1984, p.655). It can also be interesting to discuss whether overall, monitoring and scrutinizing from all kinds of institutions, such as by governmental regulatory agencies, have increased in the last two decades. There are now more strict rules and regulation on the conduction of business. Which is presumably true, then it could also mean that agency costs have decreased during the last two decades in line with increasing monitoring by these institutions.

Moreover, as paying dividends has become more common, and regular dividend payments are quite standard especially in the large cap segment it could mean that firms have a near optimal dividend payout ratio which decreases agency costs. This is what Rozeff (1982) argued in his research. Moreover, Rozeff also argued that in relation to an optimal dividend payout ratio were greater dispersion of ownership in order to minimize agency costs (1982, p.257-258). What then could be interesting is to cross the results of our research with ownership structure. Perhaps differences in how the relationship behaves between changes in cash dividend and return volatility would be transparent depending upon if the firm has a few major shareholders or if it for example, have lots of private funds.

The lack of correlation between changes in cash dividend and changes in return volatility might be explained by increased and easier communication between the companies and its shareholders and possible investors. In other words, information asymmetry could be hypothesized to have decreased, as the last decade has included an extreme boom in the use of computers and internet. Each individual can access almost any information they want at any time they want it. Companies publish their annual reports among other reports and information on their websites making it extremely easy for investors to be updated on the development of the company. Accordingly, one could argue that the discrepancy between agents and principals

(managers and shareholders) could have been diminished, resulting in lowering the agency costs as well. If managers' information and knowledge of the projects of a company is more transparent for shareholders it would probably result in less return volatility. With less information asymmetry shareholders can be more certain that managers actually do act in the best interest of the shareholders. Therefore, because investors are already aware and ready for a new announcement they will not be caught off guard and panic, causing the volume of trading to highly increase which in turn leads to return volatility.

Dividend payments also decrease excess cash flow, which according to Jensen (1986, p.323) decreases agency costs. If it is true that dividend payments are regular for companies, and that increases or no change in dividends are more common than decreases which seems to be the case looking at the descriptive statistics presented in the beginning of chapter 5. Then it might be probable that excess cash flow for companies has decreased, and with it agency costs. Quite stable dividend payments might therefore results in decreased agency costs because of less excess cash flow. Which in turn results in decreased return volatility because shareholders are not as worried when the agency costs are low. As such, and as the findings suggest there is no direct interdependence between changes in cash dividend and changes in return volatility, but there could be a chain link consisting of changes in cash dividend, less excess cash flow, reduced agency costs and at the end, lower return volatility.

6.5 - Bird-in-the-Hand Hypothesis and the Empirical Findings

The bird-in-the-hand hypothesis argues that investors prefer to get dividend payments rather than a larger capital gain in the future (Brigham and Houston, 2009, p.459). In our study, we did not find any relationship between changes in cash dividend and changes in beta or standard deviation. That means that it is possible to discuss that the bird-in-the-hand hypothesis is not present in our results.

As mentioned in chapter 3, there is a relationship between the amount of trading activity and the stock return volatility (Schwert 1990. p.30). Therefore, if we would have found that there was a relationship between our variables, we could have argued that changes in dividend matters and hence that the bird-in-the-hand could possibly be one explanation as to why the return volatility changes as dividend changes. That is, when dividend decreases for example it is probable that the bird-in-the-hand hypothesis would imply that investors who prefer to get dividends over capital gains should start trading because they prefer to get their dividend each year rather than getting a larger capital gain in the future. The amount of trading should then increase, causing the return volatility to increase, and hence, we would see a change in return volatility when dividend changes. If dividend is stable and no changes have occurred however, the trading is kept low which means that the return volatility is staying low as well.

Since we did not find a relationship between changes in cash dividend and changes in beta/standard deviation however, we cannot argue that the bird-in-the-hand hypothesis can explain our findings. The technological development may play a big part for the possible fallacy of the bird-in-the-hand hypothesis as well. As it is now possible to trade quickly and access information as soon as it arises, keeping dividend as a “security” may no longer be as important as it once were. That is, investors can now

trade as soon as information enters the market and they do not have to see dividend as a “hedge” against bankruptcies.

The bird-in-the-hand fallacy was also brought up in chapter 3. That theory is the contradicting theory to the bird-in-the-hand hypothesis. Bhattacharya (1979, cited in Al-Malkawi, et al., 2010, p.178) was one of the researchers who argued that the bird-in-the-hand was fallacious because changing dividend would not change the riskiness, instead, it is the riskiness of the company that changes the amount of dividend. As we did not find any correlation between changes in dividend and changes in either beta or standard deviation, we can however not argue that our findings can be explained by any of these theories.

For the size segments, we have gotten the same result as for the overall result in the correlation tests. That is there is no correlation in any of the size segments, nor any correlation when examining the whole stock exchange. Easterbrook (1984, p.653) argued that investors prefer dividends now rather than future capital gains because it works as a hedge against a possible bankruptcy. One could expect to find that the bird-in-the-hand hypothesis was more present in the small cap segment since that segment includes the least stable companies, and therefore the ones that are most likely to go bankrupt. We did however not see any evidence of the bird-in-the-hand hypothesis in any of the size segments when we examine these separately.

6.6 - Clientele Effect and the Empirical Findings

As mentioned in chapter 3, the clientele effect is based on the theory that investors form different clienteles depending on their preferences for dividends (Brigham and Houston, 2009, p.458-459). If the clientele effect would have been present in the findings, we would have expected the return volatility to change a lot as dividend changes. That is because clienteles who prefers a specific payout rate would start trading as the dividend changes to a more unsatisfying rate. Due to the fact that a clientele includes many investors, the trading would be vast and hence we would be able to see that the return volatility changes as the dividend changes.

Since we did not find that return volatility changed as dividend changed, this shows that there is no evidence for the presence of the clientele effect. We can however not deny the possibility that there might be clienteles on the Swedish stock market. The reason as to why we cannot deny this possibility is because these clienteles might, for example not be sensitive to small changes and only act on large, uncommon changes in dividend. Furthermore, throughout the time period there were not many big changes in dividend and we can therefore assume that normally, the clientele effect might not explain the relationship between changes in dividend and changes in return volatility.

Tax neutral investors are as mentioned in chapter 3, indifferent as to whether they get capital gains or dividends (Dahlquist, 2012, p.4) As we found no evidence for the existence of the clientele effect in our study, a lot of the investors that invests in the stocks could therefore be tax neutral, that is to say indifferent toward capital gains and dividends.

Chapter 7 – Conclusion

This chapter revisits the research question and concludes upon it. This is followed by concluding comments on how the research purpose is met, the research gap is filled and what the contribution of the research is. Finally, we provide several suggestions for further research.

7.1 - Answer to Research Question

The examination of the variables and the empirical findings of these, presented in chapter 5, and the following discussion in chapter 6 was an objective mean to answer the research question. Which reads as follows:

"Does a change in cash dividend affect stock return volatility on NASDAQ OMX Stockholm?"

Following our deductive approach and quantitative method, hypotheses were developed in order to answer both the research question as well as fulfilling the research purpose. These were tested in different statistical models and the results were presented in chapter 5 and discussed in the light of the theoretical frame of reference in chapter 6. The findings clearly indicate that changes in dividend do not have interdependence with changes in beta, nor with changes in standard deviation. Furthermore, changes in dividend do not seem to be significant predictors to changes in beta, nor to changes in standard deviation based on the logistic regression analysis. Consequently, we must answer the research question with no, a change in cash dividend does not, based on the empirical findings, affect stock return volatility on NASDAQ OMX Stockholm.

Additionally, the purpose included to identify whether more stable, regular returns resulted in less return volatility. However, through the logistic regression analysis we find no evidence of this and we conclude that as cash dividend changes do not affect return volatility, the stability of the cash dividend does not imply less return volatility. Following the discussion in chapter 6, the conclusion to the research question can be argued to be aligned with the dividend irrelevance theory.

7.2 - Fulfillment of Research Purpose, Gap and Contribution

Moreover, the research purpose was also to compare between different size segments in order to identify whether changes in dividend affect return volatility differently depending upon the market capitalization of the company. The correlation tests between changes in cash dividend and changes in beta/standard deviation showed no correlation between the variables, not when examining the whole stock exchange nor examining the size segments individually. Accordingly, we conclude that changes in cash dividend made by firms in the small cap, mid cap, or large cap segment do not affect return volatility differently.

The majority of studies we have found, in similar fields as this research, focus on dividend yields and/or dividend payout ratios in relation to stock price movements. With this study we have tried to fill a research gap, by focusing on the relationship

between the mere change in cash dividend and changes in the volatility of a stock's return. By this research we have been able to bring a new perspective and new knowledge regarding the relationship between dividends and stock return volatility. The focus have been on the Swedish market and as such it the results provide new knowledge, especially for investors interested in the Swedish stock market. Moreover, the data is recent and includes years when financial distress has been high, which is revealed in the results as well. Therefore, the results recognize that there has been a development in the economy during the last decade.

We aimed to contribute with this scientific study for further research. Seeing the results of the research it would be interesting to further explore the reasons and explanations for the lack of relation between cash dividend changes and return volatility, perhaps in a qualitative study. This research has also contributed in a practical manner, specifically for investors as well as management. We can conclude that for investors aiming to diversify their portfolios by spreading risk they need not be concerned with the stability of dividend payments of the companies. Rather, they can evaluate companies return volatility based on beta and standard deviation without concern of dividend policy when diversifying their investments. Moreover, the findings in the logistic regression analysis suggest that companies in the large cap segment have a stronger predictive ability in increasing return volatility than companies in the small cap segment do. Therefore, an investor seeking to diversify the portfolio should consider investing in companies over the different size segments. For managers the findings indicate that changing the dividend payments should not affect the return volatility of the stock in the long run. Thus, if a company has a need for capital to fund different projects, reducing the dividend would then be an inexpensive means to raise that needed capital.

7.3 - Suggestions for Further Research

During the process of this research, we have come up with a few suggestions for further research. These are suggestions that would help deepening the understanding of the lack of relationship between changes in cash dividend and changes in return volatility.

Firstly, both the irrelevances as well as the relevance theories are becoming old, even though they are still the fundamental theories. As the economic climate has changed quite a lot since the introduction of these theories and additionally, the behavior of investors, the validity of these theories today can be questioned. We suspect that the development of new theories may be in order. Therefore, we suggest that an inductive study should be made. That is in order to generate new theory rather than to test old ones.

Secondly, one of the limitations of this research is the time-frame. As the market is constantly changing, it would therefore be recommended to conduct the same study using a different time frame and perhaps also a longer time frame. More studies conducted using a different time frame would help showing if the results have been different in the past or will be different in the future.

Thirdly, as we have conducted a deductive study with the aim to research *if* there is a relationship between changes in cash dividend and changes in volatility, not *why* there is/is not and *how* these might affect each other. This would however be a very

interesting question for further research. Therefore, we suggest that inductive and perhaps qualitative studies on the subject are conducted in order to identify the reasons behind our results.

Fourthly, as mentioned in the discussion, it would be of interest to research whether the ownership structures have an influence on the relationship between changes in cash dividend and changes in return volatility. That is, if the relationship differs depending on if the company has one major shareholder compared to many small ones.

Fifthly, this research was limited to NASDAQ OMX Stockholm and the only division of firms were into different size segments. Therefore, we also advice for future research that different sectors are researched separately, in order to see if there is an effect in different sectors. In our study, we have focused on the whole NASDAQ OMX Stockholm, without finding any relationship. There is still a possibility that some sectors show a stronger relationship than others, when researched separately.

Finally, we want to emphasize that this study has focused on *changes* in cash dividend and *changes* in return volatility. We want to note that this implies both a theoretical and practical difference from previous studies that are mainly focusing on dividend itself, and not the movement of it. Consequently, this may be the reason as to why it is rather difficult to apply the conclusions of previous researches to our research question. Therefore we suggest that more advanced mathematical and statistical tools such as quantum finance are utilized in order to identify the effect of dividend and the effect of a change in dividend on return volatility. Additionally, we therefore suggest a research that takes both the dividend itself and the change in dividend into account as this would probably bring new knowledge to the debate.

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Appendix 1 - List of Companies

Large Cap

ABB
ASSA ABLOY 'B'
ALFA LAVAL
ASTRAZENECA
ATLAS COPCO 'A'
AUTOLIV SDB
AXFOOD
BOLIDEN
CASTELLUM
ELECTROLUX 'A'
ELEKTA 'B'
ENIRO
ERICSSON 'A'
SWEDBANK 'A'
GETINGE
HENNES & MAURITZ 'B'
HEXAGON 'B'
HOLMEN 'A'
HUFVUDSTADEN 'A'
HUSQVARNA 'A'
HOGANAS 'B'
INDUSTRIVARDEN 'A'
INVESTOR 'A'
JM
KINNEVIK 'A'
KUNGSLEDEN
LATOUR INVESTMENT 'B'
LUNDBERGFORETAGEN 'B'
MEDA 'A'
MELKER SCHORLING
MILLICOM INTL.CELU.SDR
MODERN TIMES GP.MTG 'A'
NCC 'A'
NCC 'B'
NOBIA
NORDEA BANK
OLD MUTUAL (OME)
ORIFLAME COSMETICS SDR
PEAB 'B'
RATOS 'A'
SAAB 'B'
SCANIA 'A'
SKF 'A'
SSAB 'A'
SANDVIK
SECURITAS 'B'
SEB 'A'
SKANSKA 'B'
STORA ENSO 'A'
STORA ENSO 'R'
SCA 'A'
SVENSKA HANDBKN.'A'
SWEDISH MATCH
TELE2 'A'
TELIASONERA
TIETO CORPORATION (OME)
TRELLEBORG 'B'
VOLVO 'A'
FABEGE

Mid Cap

AARHUSKARLSHAMN
ADDTECH 'B'
AVANZA BANK HOLDING
B&B TOOLS 'B'
G & L BEIJER
BEIJER ALMA 'B'
BETSSON 'B'
BILIA 'A'
BIOGAIA 'B'
BURE EQUITY
CLAS OHLSON 'B'
COREM PROPERTY GROUP
DIOS FASTIGHETER
ENIRO
FAGERHULT
FAST PARTNER
FASTIGHETS BALDER 'B'
FENIX OUTDOOR 'B'
GUNNEBO
HALDEX
HEBA 'B'
HIQ INTERNATIONAL
HOGANAS 'B'
INDL.& FINL.SYS.'A'
INDUTRADE
INTRUM JUSTITIA
JM
KAPPAHL

KLOVERN
KUNGSLEDEN
LINDAB INTERNATIONAL
MEKONOMEN
NEW WAVE GROUP 'B'
NOBIA
NOLATO 'B'
NORDNET 'B'
PROFFICE 'B'
REZIDOR HOTEL GROUP
SECTRA 'B'
SWECO 'A'
SAGAX
SKISTAR 'B'
SWEDOL 'B'
UNIBET GROUP SDB
WIHLBORGS FASTIGHETER
AF 'B'
ORESUND INVESTMENT

Small Cap

ACAP INVEST 'A'
ACANDO 'B'
ADDNODE 'B'
BE GROUP
BTS GROUP
BEIJER ELECTRONICS
BERGS TIMBER 'B'
BIOTAGE
BJORN BORG
BONG
CATENA
CISION
CONCORDIA MARITIME 'B'
CONNECTA
CONSILIUM 'B'
DUROC 'B'
ELANDERS 'B'
ELECTRA GRUPPEN
ELOS 'B'
ENEA
FEELGOOD SVENSKA
FORMPIPE SOFTWARE
GEVEKO 'B'
HEMTEX
I A R SYSTEMS GROUP
ITAB SHOP CONCEPT 'B'
INTELLECTA 'B'
KABE HUSVAGNAR 'B'
KNOW IT
LAGERCRANTZ GROUP 'B'
LAMMHULTS DESIGN GROUP
MSC KONSULT 'B'
MALMBERGS ELEKTRISKA 'B'
MICRO SYSTEMATION 'B'
MIDSONA 'A'
MIDWAY HOLDINGS 'A'
NOTE
NOVOTEK 'B'
NOVESTRA
OEM INTERNATIONAL 'B'
PARTNERTECH
PHONERA
POOLIA 'B'
PREVAS 'B'
PROACT IT GROUP
PROBI
PROFILGRUPPEN 'B'
RNB RETAIL AND BRANDS
RAYSEARCH LABS.'B'
READSOFT 'B'
REDERI AB TNSAT.'B'
REJLERKONCERNEN
ROTTNEROS
RORVIK TIMBER
SENSYS TRAFFIC
SIGMA B
SOFTRONIC 'B'
STUDSVIK
SVEDBERGS I DALSTORP 'B'
TRACTION 'B'
TRADEDOUBLER
TRANSCOM WWD.SDB.A
UNIFLEX 'B'
VBG GROUP
VITEC SOFTWARE GROUP 'B'
VITROLIFE
XANO INDUSTRI 'B'